Final

Site Investigation Report
Range 29, Former Weapons Demonstration Range, Parcel 87Q-X, Former Rifle Ranges, Parcels 110Q and 111Q, and Former Impact Area, Parcel 239Q-X

Fort McClellan
Calhoun County, Alabama

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Task Order CK10
Contract No. DACA21-96-D-0018
IT Project No. 796887

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Revision 0

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Executive Summary

In accordance with Contract Number DACA21-96-D-0018, Task Order CK10, IT Corporation (IT) completed a site investigation (SI) at Range 29, Former Weapons Demonstration Range, Parcel 87Q-X, Former Rifle Ranges, Parcels 110Q and 111Q, and Impact Area, Parcel 239Q-X, at Fort McClellan (FTMC), in Calhoun County, Alabama. The SI was conducted to determine whether chemical constituents are present at the site, and, if present, whether the concentrations present an unacceptable risk to human health or the environment. The SI consisted of the sampling and analysis of 33 surface and depositional soil samples, 26 subsurface soil samples, seven groundwater samples, and one surface water/sediment sample. In addition, 16 permanent monitoring wells were installed at the site to facilitate groundwater sample collection and to provide site-specific geological and hydrogeological characterization information. However, twelve of the wells were either dry or did not produce sufficient water for sampling.

Chemical analysis of samples collected at Range 29 indicates that metals, volatile organic compounds, perchlorate, herbicides, pesticides, and explosive compounds were detected in the environmental media sampled. Semivolatile organic compounds and polychlorinated biphenyls were not detected in the samples collected at the site. To evaluate whether the detected constituents pose an unacceptable risk to human health or the environment, the analytical results were compared to human health site-specific screening levels (SSSL), ecological screening values (ESV), and background screening values for FTMC.

Several metals were detected in site media at concentrations exceeding SSSLs, ESVs, and the range of background values. In addition, pesticides and herbicides were detected in groundwater at concentrations exceeding SSSLs. Furthermore, although samples could not be collected in the Parcel 87Q-X ordnance impact area because of the presence of unexploded ordnance, the area was observed to contain numerous bullet fragments. It is likely that soils in this area are contaminated with certain metals (e.g., lead, antimony, copper) associated with small-arms ammunition. Therefore, IT recommends that a remedial investigation (RI) be conducted to determine the nature and extent of contamination at the site. Specifically, the RI should focus on pesticide/herbicide contamination in groundwater, and on metals contamination in soils and sediments, particularly in the ordnance impact areas.

1.0 Introduction

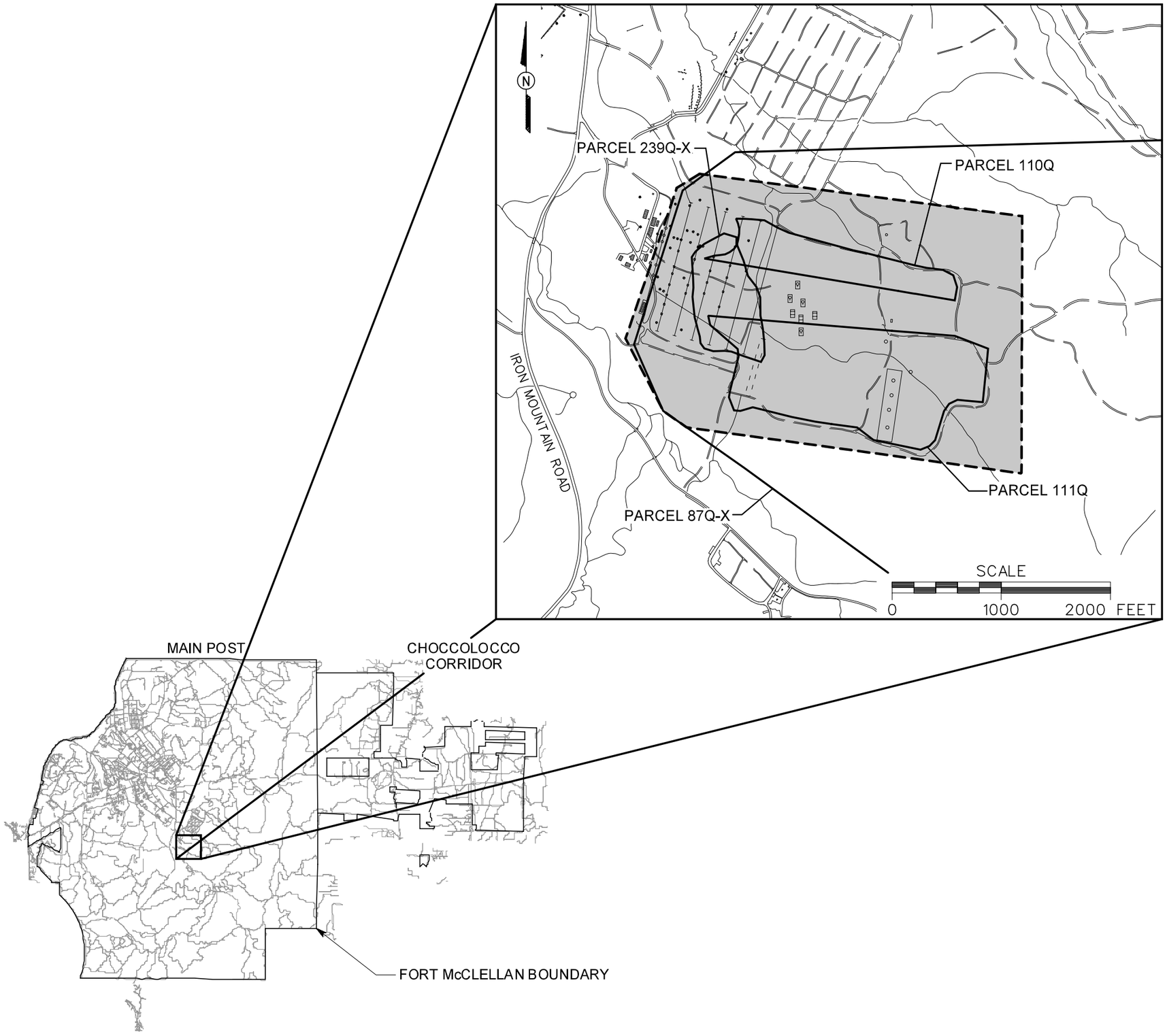
The U.S. Army has selected Fort McClellan (FTMC) located in Calhoun County, Alabama, for closure by the Base Realignment and Closure (BRAC) Commission under Public Laws 100-526 and 101-510. The 1990 Base Closure Act, Public Law 101-510, established the process by which U.S. Department of Defense (DOD) installations would be closed or realigned. The BRAC Environmental Restoration Program requires investigation and cleanup of federal properties prior to transfer to the public domain. The U.S. Army is conducting environmental studies of the impact of suspected contaminants at parcels at FTMC under the management of the U.S. Army Corps of Engineers (USACE), Mobile District. The USACE contracted IT Corporation (IT) to perform the site investigation (SI) at Range 29, Former Weapons Demonstration Range, Parcel 87Q-X, Former Rifle Ranges, Parcels 110Q and 111Q, and Impact Area, Parcel 239Q-X under Contract Number DACA21-96-D-0018, Task Order CK10.

This SI report presents specific information and results compiled from the SI, including field sampling and analysis and monitoring well installation activities, conducted at Range 29, Former Weapons Demonstration Range, Parcel 87Q-X, Former Rifle Ranges, Parcels 110Q and 111Q, and Impact Area, Parcel 239Q-X. Although the Parcel 87Q-X boundary (including range safety fan) covers an area of approximately 2,000 acres, the area of investigation for this SI is an approximately 182-acre area encompassing the firing line area of Parcel 87Q-X and all of Parcels 110Q, 111Q, and 239Q-X (Figure 1-1). For simplicity, the area of investigation is hereinafter referred to as Range 29.

1.1 Project Description

Range 29 was identified as an area to be investigated prior to property transfer. The site was classified as a Category 1 Qualified Parcel in the environmental baseline survey (EBS) (Environmental Science and Engineering, Inc. [ESE], 1998). Category 1 Qualified Parcels are areas where no storage, release, or disposal of hazardous substances or petroleum products has occurred (including no migration of these substances from adjacent areas). The parcel, however, was qualified "X" for potential unexploded ordnance (UXO) because of its use as an ordnance range.

A site-specific field sampling plan (SFSP) attachment (IT, 2000a) and a site-specific safety and health plan (SSHP) attachment were finalized in November 2000. The SFSP and SSHP were prepared to provide technical guidance for sample collection and analysis at Range 29. The SFSP was used in conjunction with the SSHP as attachments to the installation-wide work plan



LEGEND

- UNIMPROVED ROADS AND PARKING
- PAVED ROADS AND PARKING
- PARCEL BOUNDARY
- AREA OF INVESTIGATION
- SURFACE DRAINAGE / CREEK

FIGURE 1-1
SITE LOCATION MAP
RANGE 29
FORMER WEAPONS DEMONSTRATION RANGE, PARCEL 87Q-X,
FORMER RIFLE RANGES
PARCELS 110Q AND 111Q, AND
FORMER IMPACT AREA
PARCEL 239Q-X

U. S. ARMY CORPS OF ENGINEERS
MOBILE DISTRICT
FORT McCLELLAN
CALHOUN COUNTY, ALABAMA
Contract No. DACA21-96-D-0018

IT CORPORATION
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ENGR. CHCK. BY: S. MORAN
INITIATOR: L. O'HARE
PROJ. MGR.: J. YACOUB
DWG. NO.: ...\796887es.224
PROJ. NO.: 796887
DATE LAST REV.: 01/22/02
DRAWN BY:
STARTING DATE: 10/26/01
DRAWN BY: D. BOMAR
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(IT, 1998), and the installation-wide sampling and analysis plan (SAP) (IT, 2000b). The SAP includes the installation-wide safety and health plan and quality assurance plan.

The SI included fieldwork to collect 33 surface and depositional soil samples, 26 subsurface soil samples, seven groundwater samples, and one surface water/sediment sample to determine whether potential site-specific chemicals are present at Range 29, and to provide data useful for supporting any future corrective measures and closure activities.

1.2 Purpose and Objectives

The SI program was designed to collect data from site media and provide a level of defensible data and information in sufficient detail to determine whether chemical constituents are present at Range 29 at concentrations that present an unacceptable risk to human health or the environment. The conclusions of the SI in Chapter 6.0 are based on the comparison of the analytical results to human health site-specific screening levels (SSSL), ecological screening values (ESV), and background screening values for FTMC. The SSSLs and ESVs were developed by IT as part of the human health and ecological risk evaluations associated with SIs being performed under the BRAC Environmental Restoration Program at FTMC. The SSSLs and ESVs are presented in the *Final Human Health and Ecological Screening Values and PAH Background Summary Report* (IT, 2000c). Background metals screening values are presented in the *Final Background Metals Survey Report, Fort McClellan, Alabama* (Science Applications International Corporation [SAIC], 1998).

Based on the conclusions presented in this SI report, the BRAC Cleanup Team will decide either to propose "No Further Action" at the site or to conduct additional work at the site.

1.3 Site Description and History

The following paragraphs provide site descriptions and history information for Parcels 87Q-X, 110Q, 111Q, and 239Q-X.

Parcel 87Q-X. Range 29, Former Weapons Demonstration Range, Parcel 87Q-X, is located south of Bains Gap Road, east of Iron Mountain Road, and north of Kellog Drive in the south-central portion of the Main Post (Figure 1-1). Including its range safety fan, Range 29 (Parcel 87Q-X) covers approximately 2,000 acres; however, the portion of Parcel 87Q-X included in this SI is approximately 3,500 feet long (east to west) by 2,300 feet wide (north to south), and covers approximately 182 acres (Figure 1-2). The range was in use from pre-1940 until Base closure in September 1999. Types of ordnance used prior to 1977 are unknown (ESE, 1998). Ordnance

DWG. NO.: ...\796887es.225 | PROJ. NO.: 796887
INITIATOR: L. O'HARE | PROJ. MGR.: J. YACOUB
DRAFT. CHCK. BY: | ENGR. CHCK. BY: S. MORAN
DATE LAST REV.: | DRAWN BY:
STARTING DATE: 10/26/01 | DRAWN BY: D. BOMAR
01/22/02 09:50:25 AM
DBILLING
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E 674,500
E 676,500
E 678,500
N 1,163,900
N 1,162,700
N 1,161,500

TARGET AREA
FLOW DIRECTION
16 LANES WITH FOXHOLES AND SAND BAGS
FORMER TRASH STORAGE
FORMER LATRINES
FORMER MESS AND WEAPONS CLEANING AREA
FORMER BREAK AREA
FORMER RANGE SHACK
FORMER CONTROL TOWER
FORMER PITS FOR POSITION
FORMER BLEACHERS
FORMER LATRINES
FIRING POINTS
0m
50m
100m
150m
200m
250m
300m
WOODS
ORDNANCE IMPACT AREA
TARGET AREA
PARCEL 110Q
TRENCHES AND MOUNDS
TARGETS (TANKS AND JEEPS)
FILL AREA
SHACK
BULLET IMPACT AREA
NUMEROUS MOUNDS
SHACK
CIRCULAR BERMS 30' IN DIAMETER FILLED WITH WATER
DEBRIS PILES AND TRASH DUMPSTER
AREA OF EARTHEN TARGET HOUSES
PARCEL 239Q-X
BERM (POTENTIAL FIRING LINE)
PARCEL 87Q-X
PARCEL 111Q
IRON MOUNTAIN ROAD
SOUTH BRANCH OF CANE CREEK
875
900
925
950
975
1000
1025
1050
1075
1100
1125
1150

LEGEND

- UNIMPROVED ROADS AND PARKING
- PAVED ROADS AND PARKING
- REMOVED BUILDINGS
- TOPOGRAPHIC CONTOURS (CONTOUR INTERVAL - 5 FOOT)
- TREES / TREELINE
- PARCEL BOUNDARY
- AREA OF INVESTIGATION
- SURFACE DRAINAGE / CULVERT
- UTILITY POLE
- MOUNDS
- CONCRETE PAD FOR FORMER POP-UP TARGETS
- IMPACT AREA

SCALE
0 400 800 FEET

FIGURE 1-2
SITE MAP
RANGE 29
FORMER WEAPONS DEMONSTRATION RANGE, PARCEL 87Q-X,
FORMER RIFLE RANGES
PARCELS 110Q AND 111Q, AND
FORMER IMPACT AREA
PARCEL 239Q-X

U. S. ARMY CORPS OF ENGINEERS
MOBILE DISTRICT
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CALHOUN COUNTY, ALABAMA
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used at this range since 1977 included small-arms ammunition (pistol and machine gun 7.62 millimeter [mm] through 9 mm), demolition materials (C4 and trinitrotoluene charges), antitank rockets (M72LAW), and ammunition for M203 grenade launchers. Buildings, towers, and other structures, including mechanical pop-up targets at Range 29, have been removed. Structures still visible are gravel parking, training areas, and concrete foundations for the mechanical targets. Earthen mounds, approximately 4 feet high, used as firing points, also exist at the western boundary of the parcel. There were 16 firing lanes with foxholes and sandbags used at Range 29 as mentioned in FTMC Regulation No. 350-2. Other features remaining at Range 29 include target tanks and jeeps at the 250-meter target line and a culvert that extends approximately 900 feet from the southeast to the northwest in the western portion of Range 29. Range 29 was observed to contain large amounts of surface UXO including a highly explosive antitank rocket, reported to FTMC authorities by IT UXO personnel. The heavily wooded, down-range area presents a particular hazard due to abundant UXO at the site.

During a site walkover completed in March and April 2000 by IT personnel at Range 29, several features were noticed. The concrete pads used for the mechanical targets were evenly spaced along the 50, 100, 150, 200, and 250-meter target lines. An ordnance impact area was observed just behind the target pads along the 250 to 300-meter target lines. Jeeps and tanks present at the 250-meter target line were heavily impacted by ordnance. Small-caliber bullets, M203 40mm grenade launcher rounds, and 3-inch mortar rounds were observed. A fill area with reinforced concrete, brick, and other types of construction debris was located near the center of the site. Numerous mounds were located just east of this area along with a 55-gallon drum. This area appears to be a former fill area; however, the depth of fill could not be determined during the site visit. Some of the mounds were at least 4 feet high and approximately 40 feet in length. Several piles of debris were located east of a dirt road that runs east-to-west in the eastern portion of Range 29. A trash dumpster was located near the center of the site along with two soil mounds. Several small-caliber bullets were observed in a bullet impact area located east of the dumpster and soil mounds.

Physical features of Range 29 include three intermittent streams. One flows northwest across the site and joins a second stream in the northwestern portion of Parcel 87Q-X. The third stream originates in the southwest corner of Parcel 87Q-X and flows south into South Branch of Cane Creek (Figure 1-2). Topographic ridges, including Holloway Hill, border the site to the east and southeast, with elevations reaching 1,135 feet. The eastern half of Range 29 is wooded while the western half remains mostly barren with sparse trees and grass.

Parcels 110Q and 111Q. Parcels 110Q and 111Q are Former Rifle Ranges. The dates of use and types of ordnance fired at these ranges are unknown; however, it is assumed that small-caliber arms were used here. These ranges appear on Plate 5 (World War II to 1950 map) of the FTMC Archive Search Report, and are identified as rifle ranges (USACE, 1999). These ranges also appear on a 1959 Army Service Map (ESE, 1998).

Former Rifle Range, Parcel 110Q, is approximately 2,100 feet long and 300 feet wide. Parcel 110Q is located within the northern portion of Range 29, and covers approximately 15 acres (Figure 1-2). A bullet impact area, located at the east end of Range 29, is probably associated with Former Rifle Range, Parcel 110Q.

Former Rifle Range, Parcel 111Q, is approximately 2,300 feet long and 900 feet wide. Parcel 111Q is located in the southern portion of Range 29 and covers approximately 46 acres. Physical features observed during the site visit included two large circular berms in the northeastern portion of the parcel. Each berm was approximately 30 to 40 feet in diameter and filled with water. It is suspected that these were the mortar/artillery firing points. Earthen target houses were located near the center of the parcel and a shack was located approximately 400 feet northwest of the target houses. Two berms, oriented north-south, were also located at this parcel. One berm was located approximately 150 feet west of the target houses and the other berm was located farther west, near the western end of the parcel. The berm at the western end of the parcel is believed to have been the location of the firing line.

Parcel 239Q-X. Former Impact Area, Parcel 239Q-X, is located in the western portion of Range 29. Parcel 239Q-X is approximately 1,100 feet long by 500 feet wide and covers approximately 13 acres. Parcel 239Q-X was identified as an impact area on a 1949 Environmental Photographic Interpretation Center aerial photograph composite (ESE, 1998). The firing point for this impact area could not be located.

2.0 Previous Investigations

An EBS was conducted by ESE to document current environmental conditions of all FTMC property (ESE, 1998). The study was to identify sites that, based on available information, have no history of contamination and comply with DOD guidance for fast-track cleanup at closing installations. The EBS also provides a baseline picture of FTMC properties by identifying and categorizing the properties by seven criteria:

1. Areas where no storage, release, or disposal of hazardous substances or petroleum products has occurred (including no migration of these substances from adjacent areas).

2. Areas where only release or disposal of petroleum products has occurred.

3. Areas where release, disposal, and/or migration of hazardous substances has occurred, but at concentrations that do not require a removal or remedial response.

4. Areas where release, disposal, and/or migration of hazardous substances has occurred, and all removal or remedial actions to protect human health and the environment have been taken.

5. Areas where release, disposal, and/or migration of hazardous substances has occurred, and removal or remedial actions are underway, but all required remedial actions have not yet been taken.

6. Areas where release, disposal, and/or migration of hazardous substances has occurred, but required actions have not yet been implemented.

7. Areas that are not evaluated or require additional evaluation.

For non-Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) environmental or safety issues, the parcel label includes the following components: a unique non-CERCLA issue number, the letter "Q" designating the parcel as a Community Environmental Response Facilitation Act (CERFA) Category 1 Qualified Parcel, and the code for the specific non-CERCLA issue(s) present (ESE, 1998). The non-CERCLA issue codes used are:

- A = Asbestos (in buildings)
- L = Lead-Based Paint (in buildings)
- P = Polychlorinated Biphenyls
- R = Radon (in buildings)
- RD = Radionuclides/Radiological Issues

- X = Unexploded Ordnance
- CWM = Chemical Warfare Material.

The EBS was conducted in accordance with CERFA protocols (CERFA-Public Law 102-426) and DOD policy regarding contamination assessment. Record searches and reviews were performed on all reasonably available documents from FTMC, the Alabama Department of Environmental Management (ADEM), the U.S. Environmental Protection Agency (EPA) Region IV, and Calhoun County, as well as a database search of CERCLA-regulated substances, petroleum products, and Resource Conservation and Recovery Act-regulated facilities. Available historic maps and aerial photographs were reviewed to document historic land uses. Personal and telephone interviews of past and present FTMC employees and military personnel were conducted. In addition, visual site inspections were conducted to verify conditions of specific property parcels.

Range 29 was identified as a Category 1 CERFA site in the EBS. Category 1 sites are areas where no known or recorded storage, release, or disposal (including migration) has occurred on site property. The site, however, was qualified "X" because of its use as an ordnance range. Previous investigations to document site environmental conditions have not been conducted at Range 29. Therefore, the site required additional evaluation to determine its environmental condition.

3.0 Current Site Investigation Activities

This chapter summarizes SI activities conducted by IT at Range 29, including UXO avoidance, environmental sampling and analysis, and groundwater monitoring well installation activities.

3.1 UXO Avoidance

UXO avoidance was performed at Range 29 following methodology outlined in Section 4.1.7 of the SAP (IT, 2000b). IT UXO personnel used a Schonstedt Heliflux Magnetic Locator to perform a surface sweep of the area prior to site access. After the site was cleared for access, sample locations were cleared using a Foerster Ferex Electromagnetic Detector following procedures outlined in Section 4.1.7.3 of the SAP (IT, 2000b).

3.2 Environmental Sampling

The environmental sampling performed during the SI at Range 29 included the collection of surface and depositional soil samples, subsurface soil samples, groundwater samples, and surface water/sediment samples for chemical analysis. The sample locations were determined by observing site physical characteristics during a site walkover and by reviewing historical documents pertaining to activities conducted at the site. The sample locations, media, and rationale are summarized in Table 3-1. Sampling locations are shown on Figure 3-1. Samples were submitted for laboratory analysis of site-related parameters listed in Section 3.4. IT contracted Environmental Services Network, Inc. (ESN), a direct-push technology (DPT) subcontractor, to assist in surface and subsurface soil sample collection.

3.2.1 Surface and Depositional Soil Sampling

Twenty-six surface soil samples and seven depositional soil samples were collected at Range 29, as shown on Figure 3-1. Soil sampling locations and rationale are presented in Table 3-1. Surface and depositional soil sample designations and analytical parameters are listed in Table 3-2. Soil sampling locations were determined in the field by the on-site geologist based on UXO avoidance activities, sampling rationale, presence of surface structures, and site topography.

Sample Collection. Surface and depositional soil samples were collected from the upper 1-foot of soil using either a DPT sampling system or a 3-inch-diameter stainless-steel hand auger, following the methodology specified in Section 4.9.1.1 of the SAP (IT, 2000b). Surface and depositional soil samples were collected by first removing surface debris (e.g., rocks and vegetation) from the immediate sample area. The soil was collected with the sampling device and screened with a photoionization detector (PID) in accordance with Section 4.7.1.1 of the

Table 3-1

Sampling Locations and Rationale
Range 29, Former Weapons Demonstration Range, Parcel 87Q-X, Former Rifle Ranges
Parcels 110Q and 111Q, and Former Impact Area, Parcel 239Q-X
Fort McClellan, Calhoun County, Alabama

Sample Location	Sample Media	Sample Location Rationale
HR-87Q-MW01	Surface soil and subsurface soil	Surface and subsurface soil samples were collected in northwestern portion of Range 29 approximately 20 feet east of the firing line to determine if potential site-specific chemicals are present in soils as a result of range activities.
HR-87Q-MW02	Surface soil and subsurface soil	Surface and subsurface soil samples were collected on the western end of Range 29 approximately 40 feet west of the firing line to determine if potential site-specific chemicals are present in soils as a result of range activities.
HR-87Q-MW03	Surface soil and subsurface soil	Surface and subsurface soil samples were collected at the west end of Parcel 111Q near probable former firing line to determine if potential site-specific chemicals are present in soils as a result of range activities.
HR-87Q-MW04	Surface soil and subsurface soil	Surface and subsurface soil samples were collected at the west end of Parcel 111Q near probable firing line to determine if potential site-specific chemicals are present in soils as a result of range activities.
HR-87Q-MW05	Surface soil, subsurface soil, and groundwater	Surface soil, subsurface soil, and groundwater samples were collected adjacent to the Ordnance Impact Area located near the middle of the site to determine if potential site-specific chemicals are present in soils and groundwater as a result of range activities.
HR-87Q-MW09	Surface soil and subsurface soil	Surface and subsurface soil samples were collected at the southwestern portion of Range 29 boundary to determine if potential site-specific chemicals are present in soils as a result of range activities.
HR-87Q-MW10	Surface soil and subsurface soil	Surface and subsurface soil samples were collected directly downslope of the mounds located in the area of former target houses located near the center of Parcel 111Q to determine if potential site-specific chemicals are present in soils as a result of range activities.
HR-87Q-MW11	Surface soil and subsurface soil	Surface and subsurface soil samples were collected directly downslope of the mounds in the area of former target houses near the center of Parcel 111Q to determine if potential site-specific chemicals are present in soils as a result of range activities.
HR-87Q-MW12	Surface soil, subsurface soil, and groundwater	Surface soil, subsurface soil, and groundwater samples were collected immediately downgradient of a possible fill area located near the middle of Range 29 to determine if potential site-specific chemicals are present in soils and groundwater as a result of range activities.
HR-87Q-MW13	Surface soil and subsurface soil	Surface and subsurface soil samples were collected in the southeastern portion of Parcel 111Q to determine if potential site-specific chemicals are present in soils as a result of range activities.
HR-87Q-MW14	Surface soil, subsurface soil, and groundwater	Surface soil, subsurface soil, and groundwater samples were collected near mounded areas in east-central area of Range 29 to determine if potential site-specific chemicals are present in soils and groundwater as a result of range activities.
HR-87Q-MW15	Surface soil, subsurface soil, and groundwater	Surface soil, subsurface soil, and groundwater samples were collected in an area where several mounds and trenches were observed to determine if potential site-specific chemicals are present in soils and groundwater as a result of range activities.
HR-87Q-MW16	Surface soil and subsurface soil	Surface and subsurface soil samples were collected in an area where approximately six mounds were observed at the east end of Parcel 111Q to determine if potential site-specific chemicals are present in soils as a result of range activities.
HR-87Q-MW17	Surface soil and subsurface soil	Surface and subsurface soil samples were collected near the southwest corner (downslope) of the bullet impact area to determine if potential site-specific chemicals are present in soils as a result of range activities.
HR-87Q-MW18	Surface soil and subsurface soil	Surface and subsurface soil samples were collected near the northern portion (downslope) of the bullet impact area to determine if potential site-specific chemicals are present in soils as a result of range activities.

Table 3-1

Sampling Locations and Rationale
Range 29, Former Weapons Demonstration Range, Parcel 87Q-X, Former Rifle Ranges
Parcels 110Q and 111Q, and Former Impact Area, Parcel 239Q-X
Fort McClellan, Calhoun County, Alabama

Sample Location	Sample Media	Sample Location Rationale
HR-87Q-MW19	Surface soil and subsurface soil	Surface and subsurface soil samples were collected in the vicinity of the Former Weapons Cleaning Area at the west end of Range 29 to determine if potential site-specific chemicals are present in soils as a result of range activities.
HR-87Q-GP01	Surface soil and subsurface soil	Surface and subsurface soil samples were collected at the south end of the 50 meter target line to determine if potential site-specific chemicals are present in soils as a result of range activities.
HR-87Q-GP02	Surface soil and subsurface soil	Surface and subsurface soil samples were collected at the north end of the 50 meter firing line to determine if potential site-specific chemicals are present in soils as a result of range activities.
HR-87Q-GP03	Surface soil and subsurface soil	Surface and subsurface soil samples were collected near the middle of the 100 meter target line to determine if potential site-specific chemicals are present in soils as a result of range activities.
HR-87Q-GP04	Surface soil and subsurface soil	Surface and subsurface soil samples were collected near the north end of the 150 meter target line to determine if potential site-specific chemicals are present in soils as a result of range activities.
HR-87Q-GP05	Surface soil and subsurface soil	Surface and subsurface soil samples were collected at the north end of the 200 meter target line, downslope from the Ordnance Impact Area to determine if potential site-specific chemicals are present in soils as a result of range activities.
HR-87Q-GP06	Surface soil and subsurface soil	Surface and subsurface soil samples were collected near the middle of the 200 meter target line, downslope from the Ordnance Impact Area to determine if potential site-specific chemicals are present in soils as a result of range activities.
HR-87Q-GP07	Surface soil and subsurface soil	Surface and subsurface soil samples were collected in the southwest corner of the Range 29 boundary to determine if potential site-specific chemicals are present in soils as a result of range activities.
HR-87Q-GP08	Surface soil and subsurface soil	Surface and subsurface soil samples were collected in the southwest corner of the Range 29 boundary to determine if potential site-specific chemicals are present in soils as a result of range activities.
HR-87Q-GP09	Surface soil and subsurface soil	Surface and subsurface soil samples were collected in the southwest corner of the Range 29 boundary to determine if potential site-specific chemicals are present in soils as a result of range activities.
HR-87Q-GP10	Surface soil and subsurface soil	Surface and subsurface soil samples were collected in the southwest corner of the Range 29 boundary to determine if potential site-specific chemicals are present in soils as a result of range activities.
HR-87Q-DEP01	Depositional Soil	A depositional soil sample was collected from a dry creek bed near the 300 meter target line at Range 29 to determine if potential site-specific chemicals are present in soils as a result of range activities.
HR-87Q-DEP02	Depositional Soil	A depositional soil sample was collected in the dry creek bed crossing the southern end of the firing lines at Range 29 to determine if potential site-specific chemicals are present in soils as a result of range activities.
HR-87Q-DEP03	Depositional Soil	A depositional soil sample was collected in the dry creek bed crossing the southern end of the firing lines at Range 29 to determine if potential site-specific chemicals are present in soils as a result of range activities.
HR-87Q-DEP04	Depositional Soil	A depositional soil sample was collected from a dry creek bed near the 200 meter target line at Range 29 to determine if potential site-specific chemicals are present in soils as a result of range activities.

Table 3-1

Sampling Locations and Rationale
Range 29, Former Weapons Demonstration Range, Parcel 87Q-X, Former Rifle Ranges
Parcels 110Q and 111Q, and Former Impact Area, Parcel 239Q-X
Fort McClellan, Calhoun County, Alabama

Sample Location	Sample Media	Sample Location Rationale
HR-87Q-DEP05	Depositional Soil	A depositional soil sample was collected near the southeast area of Range 29 to determine if potential site-specific chemicals are present in soils as a result of range activities.
HR-87Q-DEP06	Depositional Soil	A depositional soil sample was collected in the north-central area of Range 29 to determine if potential site-specific chemicals are present in soils as a result of range activities.
HR-87Q-DEP07	Depositional Soil	A depositional soil sample was collected from a surface drainage feature in the southwest portion of Range 29 that empties into the South Branch of Cane Creek to determine if potential site-specific chemicals are present in soils as a result of range activities.
HR-87Q-SW/SD06	Surface water and sediment	Surface water and sediment samples were collected northwest (downstream) of Range 29.

E 674,500
E 676,500
E 678,500
N 1,163,900
N 1,162,700
N 1,161,500
N
TARGET AREA
FLOW DIRECTION
HR-87Q-SW/SD06
16 LANES WITH FOXHOLES AND SAND BAGS
FORMER TRASH STORAGE
FORMER LATRINES
FORMER MESS AND WEAPONS CLEANING AREA
HR-87Q-MW19
FORMER BREAK AREA
FORMER RANGE SHACK
FORMER CONTROL TOWER
FORMER PITS FOR POSITION
FORMER BLEACHERS
FORMER LATRINES
FIRING POINTS
0m
50m
100m
150m
200m
250m
300m
WOODS
HR-87Q-MW01
HR-87Q-GP02
HR-87Q-GP05
HR-87Q-GP04
HR-87Q-GP06
HR-87Q-GP03
HR-87Q-MW02
HR-87Q-GP01
HR-87Q-DEP03
HR-87Q-DEP02
HR-87Q-DEP06
HR-87Q-DEP04
ORDNANCE IMPACT AREA
TARGET AREA
WOODS
PARCEL 110Q
TRENCHES AND MOUNDS
TARGETS (TANKS AND JEEPS)
HR-87Q-MW15
HR-87Q-MW18
HR-87Q-MW12
FILL AREA
SHACK
HR-87Q-MW17
BULLET IMPACT AREA
HR-87Q-MW05
HR-87Q-MW14
NUMEROUS MOUNDS
HR-87Q-DEP01
(SEE NOTE 1)
CIRCULAR BERMS 30' IN DIAMETER FILLED WITH WATER
HR-87Q-MW16
DEBRIS PILES AND TRASH DUMPSTER
PARCEL 239Q-X
HR-87Q-GP07
HR-87Q-GP08
HR-87Q-MW04
AREA OF EARTHEN TARGET HOUSES
HR-87Q-MW09
HR-87Q-GP09
HR-87Q-MW03
HR-87Q-MW11
HR-87Q-GP10
WOODS
BERM (POTENTIAL FIRING LINE)
HR-87Q-DEP07
FLOW DIRECTION
HR-87Q-MW10
HR-87Q-DEP05
HR-87Q-MW13
PARCEL 87Q-X
FLOW DIRECTION
SOUTH BRANCH OF CANE CREEK
FLOW DIRECTION
PARCEL 111Q
IRON MOUNTAIN ROAD
875
900
925
950
975
1000
1025
1050
1075
1100
1125
1150

LEGEND

- UNIMPROVED ROADS AND PARKING
- PAVED ROADS AND PARKING
- REMOVED BUILDINGS
- TOPOGRAPHIC CONTOURS (CONTOUR INTERVAL - 25 FOOT)
- TREES / TREELINE
- PARCEL BOUNDARY
- AREA OF INVESTIGATION
- SURFACE DRAINAGE / CULVERT
- UTILITY POLE
- MOUNDS
- CONCRETE PAD FOR FORMER POP-UP TARGETS
- IMPACT AREA
- RESIDUUM MONITORING WELL/ SURFACE AND SUBSURFACE SOIL SAMPLE LOCATION
- GROUNDWATER, SURFACE AND SUBSURFACE SOIL SAMPLE LOCATION
- SURFACE AND SUBSURFACE SOIL SAMPLE LOCATION
- SURFACE WATER/SEDIMENT SAMPLE LOCATION
- DEPOSITIONAL SOIL SAMPLE LOCATION

NOTE:

1. SAMPLE LOCATION BASED ON FIELD NOTES.

SCALE
0 400 800 FEET

FIGURE 3-1
SAMPLE LOCATION MAP
RANGE 29
FORMER WEAPONS DEMONSTRATION RANGE, PARCEL 87Q-X, FORMER RIFLE RANGES PARCELS 110Q AND 111Q, AND FORMER IMPACT AREA PARCEL 239Q-X

U. S. ARMY CORPS OF ENGINEERS
MOBILE DISTRICT
FORT McCLELLAN
CALHOUN COUNTY, ALABAMA
Contract No. DACA21-96-D-0018

IT CORPORATION
A Member of The IT Group

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DRAFT. CHCK. BY:
ENGR. CHCK. BY: S. MORAN
DRAWN BY:
DRAWN BY: D. BOMAR
STARTING DATE: 10/26/01
DATE LAST REV.:
INITIATOR: L. O'HARE
PROJ. MGR.: J. YACOUB
PROJ. NO.: 796887
DWG. NO.: ...\796887es.226

Table 3-2

Soil Sample Designations and Analytical Parameters
Range 29, Former Weapons Demonstration Range, Parcel 87Q-X,
Former Rifle Ranges, Parcels 110Q and 111Q, and Former Impact Area, Parcel 239Q-X
Fort McClellan, Calhoun County, Alabama

Sample Location	Sample Designation	Sample Depth (ft. bgs)	QA/QC Samples			Analytical Suite
			Field Duplicates	Field Splits	MS/MSD	
HR-87Q-MW01	HR-87Q-MW01-SS-HL0001-REG	0-1			HR-87Q-MW01-SS-HL0001-MS/MSD	TAL Metals, Perchlorate, and Explosives
	HR-87Q-MW01-DS-HL0002-REG	6-7				
HR-87Q-MW02	HR-87Q-MW02-SS-HL0003-REG	0-1	HR-87Q-MW02-SS-HL0004-FD	HR-87Q-MW02-SS-HL0005-FS		TAL Metals, Perchlorate, and Explosives
	HR-87Q-MW02-DS-HL0006-REG	11-12				
HR-87Q-MW03	HR-87Q-MW03-SS-HL0007-REG	0-1				TAL Metals, Perchlorate, and Explosives
	HR-87Q-MW03-DS-HL0008-REG	5-6				
HR-87Q-MW04	HR-87Q-MW04-SS-HL0009-REG	0-1				TAL Metals, Perchlorate, and Explosives
	HR-87Q-MW04-DS-HL0010-REG	3-4				
HR-87Q-MW05	HR-87Q-MW05-SS-HL0011-REG	0-1				TAL Metals, Perchlorate, and Explosives
	HR-87Q-MW05-DS-HL0012-REG	9-10				
HR-87Q-MW09	HR-87Q-MW09-SS-HL0020-REG	0-1				TAL Metals, Perchlorate, and Explosives
	HR-87Q-MW09-DS-HL0021-REG	4-6				
HR-87Q-MW10	HR-87Q-MW10-SS-HL0026-REG	0-1	HR-87Q-MW12-SS-HL0027-FD	HR-87Q-MW12-SS-HL0028-FS		TAL Metals, Perchlorate, and Explosives
	HR-87Q-MW10-DS-HL0029-REG	4-6				
HR-87Q-MW11	HR-87Q-MW11-SS-HL0024-REG	0-1				TAL Metals, Perchlorate, and Explosives
	HR-87Q-MW11-DS-HL0025-REG	3-4				
HR-87Q-MW12	HR-87Q-MW12-SS-HL0022-REG	0-1				VOCs, SVOCs, CL Pesticides, PCBs, OP Pesticides, CL Herbicides, TAL Metals, Perchlorate, and Explosives
	HR-87Q-MW12-DS-HL0023-REG	8-12				

Table 3-2

Soil Sample Designations and Analytical Parameters
Range 29, Former Weapons Demonstration Range, Parcel 87Q-X,
Former Rifle Ranges, Parcels 110Q and 111Q, and Former Impact Area, Parcel 239Q-X
Fort McClellan, Calhoun County, Alabama

Sample Location	Sample Designation	Sample Depth (ft. bgs)	QA/QC Samples			Analytical Suite
			Field Duplicates	Field Splits	MS/MSD	
HR-87Q-MW13	HR-87Q-MW13-SS-HL0030-REG	0-1			HR-87Q-MW13-HL0030-MS/MSD	TAL Metals, Perchlorate, and Explosives
	HR-87Q-MW13-DS-HL0031-REG	5-6				
HR-87Q-MW14	HR-87Q-MW14-SS-HL0032-REG	0-1				TAL Metals, Perchlorate, and Explosives
	HR-87Q-MW14-DS-HL0033-REG	11-12				
HR-87Q-MW15	HR-87Q-MW15-SS-HL0034-REG	0-1				TAL Metals, Perchlorate, and Explosives
	HR-87Q-MW15-DS-HL0035-REG	11-12				
HR-87Q-MW16	HR-87Q-MW16-SS-HL0036-REG	0-1				TAL Metals, Perchlorate, and Explosives
	HR-87Q-MW16-DS-HL0037-REG	4-5				
HR-87Q-MW17	HR-87Q-MW17-SS-HL0038-REG	0-1	HR-87Q-MW17-SS-HL0039-FD		HR-87Q-MW17-SS-HL0038-MS/MSD	TAL Metals, Perchlorate, and Explosives
	HR-87Q-MW17-DS-HL0040-REG	6-7				
HR-87Q-MW18	HR-87Q-MW18-SS-HL0041-REG	0-1				TAL Metals, Perchlorate, and Explosives
	HR-87Q-MW18-DS-HL0042-REG	1-3				
HR-87Q-MW19	HR-87Q-MW19-SS-HL0066-REG	0-1				VOCs, TAL Metals, Perchlorate, and Explosives
	HR-87Q-MW19-DS-HL0067-REG	8-10				
HR-87Q-GP01	HR-87Q-GP01-SS-HL0043-REG	0-1				TAL Metals, Perchlorate, and Explosives
	HR-87Q-GP01-DS-HL0044-REG	9-10				
HR-87Q-GP02	HR-87Q-GP02-SS-HL0045-REG	0-1				TAL Metals, Perchlorate, and Explosives
	HR-87Q-GP02-DS-HL0046-REG	9-11				
HR-87Q-GP03	HR-87Q-GP03-SS-HL0047-REG	0-1				TAL Metals, Perchlorate, and Explosives
	HR-87Q-GP03-DS-HL0048-REG	7-9				

Table 3-2

Soil Sample Designations and Analytical Parameters
Range 29, Former Weapons Demonstration Range, Parcel 87Q-X,
Former Rifle Ranges, Parcels 110Q and 111Q, and Former Impact Area, Parcel 239Q-X
Fort McClellan, Calhoun County, Alabama

Sample Location	Sample Designation	Sample Depth (ft. bgs)	QA/QC Samples			Analytical Suite
			Field Duplicates	Field Splits	MS/MSD	
HR-87Q-GP04	HR-87Q-GP04-SS-HL0049-REG	0-1				TAL Metals, Perchlorate, and Explosives
	HR-87Q-GP04-DS-HL0050-REG	10-12				
HR-87Q-GP05	HR-87Q-GP05-SS-HL0051-REG	0-1	HR-87Q-GP05-SS-HL0052-FD			TAL Metals, Perchlorate, and Explosives
	HR-87Q-GP05-DS-HL0053-REG	9-11				
HR-87Q-GP06	HR-87Q-GP06-SS-HL0054-REG	0-1				TAL Metals, Perchlorate, and Explosives
	HR-87Q-GP06-DS-HL0055-REG	10-12				
HR-87Q-GP07	HR-87Q-GP07-SS-HL0056-REG	0-1				TAL Metals, Perchlorate, and Explosives
	HR-87Q-GP07-DS-HL0057-REG	5-6				
HR-87Q-GP08	HR-87Q-GP08-SS-HL0058-REG	0-1				TAL Metals, Perchlorate, and Explosives
	HR-87Q-GP08-DS-HL0059-REG	5-6				
HR-87Q-GP09	HR-87Q-GP09-SS-HL0060-REG	0-1	HR-87Q-GP09-SS-HL0061-FD	HR-87Q-GP09-SS-HL0062-FS		TAL Metals, Perchlorate, and Explosives
	HR-87Q-GP09-DS-HL0063-REG	10-12				
HR-87Q-GP10	HR-87Q-GP10-SS-HL0064-REG	0-1				TAL Metals, Perchlorate, and Explosives
	HR-87Q-GP10-DS-HL0065-REG	4-6				
HR-87Q-DEP01	HR-87Q-DEP01-DEP-HL0066-REG	0-1				TAL Metals, Perchlorate, Explosives, TOC, and Grain Size
HR-87Q-DEP02	HR-87Q-DEP02-DEP-HL0067-REG	0-1			HR-87Q-DEP02-DEP-HL0067-MS/MSD	TAL Metals, Perchlorate, Explosives, TOC, and Grain Size
HR-87Q-DEP03	HR-87Q-DEP03-DEP-HL0069-REG	0-1	HR-87Q-DEP03-DEP-HL0070-FD	HR-87Q-DEP03-DEP-HL0071-FS		TAL Metals, Perchlorate, Explosives, TOC, and Grain Size
HR-87Q-DEP04	HR-87Q-DEP04-DEP-HL0075-REG	0-1				TAL Metals, Perchlorate, Explosives, TOC, and Grain Size

Table 3-2

Soil Sample Designations and Analytical Parameters
Range 29, Former Weapons Demonstration Range, Parcel 87Q-X,
Former Rifle Ranges, Parcels 110Q and 111Q, and Former Impact Area, Parcel 239Q-X
Fort McClellan, Calhoun County, Alabama

Sample Location	Sample Designation	Sample Depth (ft. bgs)	QA/QC Samples			Analytical Suite
			Field Duplicates	Field Splits	MS/MSD	
HR-87Q-DEP05	HR-87Q-DEP05-DEP-HL0076-REG	0-0.5				TAL Metals, Perchlorate, Explosives, TOC, and Grain Size
HR-87Q-DEP06	HR-87Q-DEP05-DEP-HL0077-REG	0-0.5				TAL Metals, Perchlorate, Explosives, TOC, and Grain Size
HR-87Q-DEP07	HR-87Q-DEP05-DEP-HL0078-REG	0-0.5				TAL Metals, Perchlorate, Explosives, TOC, and Grain Size

Cl - Chlorinated.
FD - Field duplicate.
FS - Field split.
MS/MSD - Matrix spike/matrix spike duplicate.
OP - Organophosphorus.
PCB - Polychlorinated biphenyl.
QA/QC - Quality assurance/quality control.
REG - Field sample.
SVOC - Semivolatile organic compound.
TAL - Target analyte list.
TOC - Total organic carbon.
VOC - Volatile organic compound.

SAP (IT, 2000b). Samples for volatile organic compound (VOC) analysis were collected directly from the sampler with three EnCore® samplers. The soil was then transferred to a clean stainless-steel bowl, homogenized, and placed in the appropriate sample containers. Sample collection logs are included in Appendix A. The samples were analyzed for the parameters listed in Table 3-2 using methods outlined in Section 3.4.

3.2.2 Subsurface Soil Sampling

Subsurface soil samples were collected from 26 soil borings at Range 29, as shown on Figure 3-1. Subsurface soil sampling locations and rationale are presented in Table 3-1. Subsurface soil sample designations, depths, and analytical parameters are listed in Table 3-2. Soil boring sample locations were determined in the field by the on-site geologist based on UXO avoidance activities, sampling rationale, presence of surface structures, and site topography.

Sample Collection. Subsurface soil samples were collected from soil borings at depths greater than 1-foot below ground surface (bgs) in the unsaturated zone. The soil borings were advanced and samples collected using the DPT sampling procedures specified in Section 4.9.1.1 of the SAP (IT, 2000b). Sample collection logs are included in Appendix A. The samples were analyzed for the parameters listed in Table 3-2 using methods outlined in Section 3.4.

Subsurface soil samples were collected continuously to 12 feet bgs or until DPT sampler refusal was encountered. Samples were field screened using a PID in accordance with Section 4.7.1.1 of the SAP (IT, 2000b) to measure for volatile organic vapors. The sample displaying the highest reading was selected and sent to the laboratory for analysis; however, at those locations where PID readings were not greater than background, the deepest sample interval above the saturated zone was submitted for analysis. Samples for VOC analysis were collected directly from the sampler using three EnCore® samplers. The soil was then transferred to a clean stainless-steel bowl, homogenized, and placed in the appropriate sample containers. The on-site geologist constructed a detailed boring log for each soil boring. The boring log for each borehole is included in Appendix B. At the completion of soil sampling, boreholes were abandoned with bentonite pellets and hydrated with potable water following borehole abandonment procedures summarized in Appendix B of the SAP (IT, 2000b).

3.2.3 Monitoring Well Installation

Sixteen permanent groundwater monitoring wells were installed in the saturated zone or on top of competent bedrock at Range 29 for the collection of groundwater samples for laboratory analysis. The well/groundwater sampling locations are shown on Figure 3-1. Table 3-3

Table 3-3

Monitoring Well Construction Summary
Range 29, Former Weapons Demonstration Range, Parcel 87Q-X, Former Rifle Ranges, Parcels 110Q and 111Q, and Former Impact Area, Parcel 239Q-X
Fort McClellan, Calhoun County, Alabama

Monitoring Well	Northing	Easting	Ground Elevation (ft amsl)	TOC Elevation (ft amsl)	Well Depth (ft bgs)	Screen Length (ft)	Screen Interval (ft bgs)	Well Material
HR-87Q-MW01[a]	1163619.20	675123.92	858.78	860.90	20.3	10	10.1 - 20.1	2" ID Sch. 40 PVC
HR-87Q-MW02[a]	1163129.84	674999.99	846.83	848.95	13.8	5	8.6 - 13.6	2" ID Sch. 40 PVC
HR-87Q-MW03	1162038.18	675981.71	885.65	887.46	23.0	15	7.5 - 22.5	2" ID Sch. 40 PVC
HR-87Q-MW04	1162196.02	675995.35	885.61	887.56	27.0	10	15.5 - 25.5	2" ID Sch. 40 PVC
HR-87Q-MW05	1162665.25	676457.97	889.76	891.65	41.0	15	26.0 - 41.0	2" ID Sch. 40 PVC
HR-87Q-MW09[a]	1162042.39	675319.17	870.89	872.72	21.5	10	11.3 - 21.3	2" ID Sch. 40 PVC
HR-87Q-MW10	1161741.47	677065.58	960.05	961.85	42.0	15	27.0 - 42.0	2" ID Sch. 40 PVC
HR-87Q-MW11	1162018.15	677192.82	968.16	970.04	50.0	20	30.0 - 50.0	2" ID Sch. 40 PVC
HR-87Q-MW12	1162827.24	676796.97	893.45	895.50	39.1[b]	20	17.0 - 37.0	2" ID Sch. 40 PVC
HR-87Q-MW13	1161558.91	677438.68	1026.42	1028.30	65.5	20	45.5 - 65.5	2" ID Sch. 40 PVC
HR-87Q-MW14	1162627.36	677184.98	918.41	920.49	38[b]	20	15.9 - 35.9	2" ID Sch. 40 PVC
HR-87Q-MW15	1162936.95	677256.65	901.32	903.29	37.5	20	17.0 - 37.0	2" ID Sch. 40 PVC
HR-87Q-MW16	1162398.46	677358.05	935.32	936.98	24.0	10	14.0 - 24.0	2" ID Sch. 40 PVC
HR-87Q-MW17	1162774.77	677651.38	924.58	926.36	18.0	10	8.0 - 18.0	2" ID Sch. 40 PVC
HR-87Q-MW18	1162918.11	677738.78	925.10	927.23	10.0	5	5.0 - 10.0	2" ID Sch. 40 PVC
HR-87Q-MW19[a]	1163700.51	674822.44	847.79	849.67	24.4	10	14.2 - 24.2	2" ID Sch. 40 PVC

Permanent wells installed using hollow-stem auger drill rig, except as noted by *.
[a]Well installed using an air-rotary drill rig.
[b]A 2-ft PVC sump was attached to the bottom of the screen.
Horizontal coordinates referenced to the U.S. State Plane Coordinate System, Alabama East Zone, North American Datum of 1983 (NAD83).
Elevations referenced to the North American Vertical Datum of 1988 (NAVD88).
2" ID Sch. 40 PVC - 2-inch inside diameter, Schedule 40, polyvinyl chloride.
amsl - Above mean sea level.
bgs - Below ground surface.
ft - Feet.
TOC - Top of casing.

summarizes construction details of the wells installed at Range 29. The well construction logs are included in Appendix B.

IT contracted Miller Drilling, Inc. to install the permanent wells using hollow-stem auger and/or air-rotary drilling techniques. The wells were installed following procedures outlined in Section 4.7 and Appendix C of the SAP (IT, 2000b). The borehole at each well location was advanced with a 4.25-inch inside diameter (ID) hollow-stem auger from ground surface to the saturated zone or competent bedrock. At locations where auger refusal was encountered prior to reaching the saturated zone or competent bedrock, the borehole was continued using an air-rotary drill rig. Beginning at the DPT completion depth, lithologic samples were collected at 5-foot intervals using a 2-foot-long, 2-inch ID carbon steel split-spoon sampler. The borehole was advanced until the first water-bearing zone (or auger refusal) was encountered. Where split-spoon refusal was encountered, the on-site geologist continued the lithological log for each borehole from the depth of split-spoon refusal to the bottom of the borehole by logging the auger drill cuttings. The drill cuttings were logged to determine lithologic changes and the approximate depth of groundwater encountered during drilling. This information was used to determine the optimal placement of the monitoring well screen interval and to provide site-specific geological and hydrogeological information.

During drilling activities at four well locations (HR-87Q-MW01, HR-87Q-MW02, HR-87Q-MW09, and HR-87Q-MW19) hollow-stem auger refusal was encountered prior to reaching groundwater. At these locations, drilling continued using air-rotary drilling techniques to verify that competent bedrock had been encountered. During air-rotary drilling, a 6.25-inch outer diameter tri-cone rotary bit was lowered into the existing 8.25-inch diameter borehole previously drilled with the hollow-stem auger. The air rig was used to drill approximately 0.5 feet past the depth of auger refusal to verify competent bedrock. Once competent bedrock was determined, a permanent residuum monitoring well was installed following procedures outlined in Section 4.7 and Appendix C of the SAP (IT, 2000b). The boring log for each borehole is included in Appendix B.

Upon reaching the target depth in each borehole, a 5- to 20-foot length of 2-inch ID, 0.010-inch continuous slot, Schedule 40 polyvinyl chloride (PVC) screen with a 3-inch end cap was placed through the auger to the bottom of the borehole. At monitoring wells HR-87Q-MW12 and HR-87Q-MW14 where bedrock was not encountered, a 2-foot PVC sump was attached to the bottom of the screen. The screen and end cap (or sump) were attached to 2-inch ID, flush-threaded Schedule 40 PVC riser. A number 1 filter sand (environmentally safe, clean fine sand, sieve size

20 to 40) was tremied around the well screen to approximately 2 feet above the top of the well screen as the augers were removed. The well was surged using a solid PVC surge block for approximately 10 minutes, or until no more settling of the filter sand occurred inside the borehole. A bentonite seal, consisting of approximately 3 feet of bentonite pellets, was placed immediately on top of the filter sand and hydrated with potable water. At wells where the bentonite seal was installed below the water table surface, the bentonite pellets were allowed to hydrate in the groundwater. The bentonite seal placement and hydration followed procedures in Appendix C of the SAP (IT, 2000b). Bentonite-cement grout was tremied into the annular space of the well from the top of the bentonite seal to the ground surface. A locking protective steel casing was placed over the PVC well riser and a concrete pad was constructed around the well. Protective steel posts were installed around the well pad. A locking well cap was placed on the PVC well riser.

The wells were developed by surging and pumping with a 2-inch-diameter submersible pump in accordance with methodology outlined in Section 4.8 and Appendix C of the SAP (IT, 2000b). The submersible pump used for well development was moved in an up-and-down fashion to encourage any residual well installation materials to enter the well. These materials were then pumped out of the well in order to re-establish the natural hydraulic flow conditions. Development was performed until the water turbidity was less than or equal to 20 nephelometric turbidity units (NTU), for a maximum of 8 hours, or until the well was pumped dry three times. The well development logs are included in Appendix C.

3.2.4 Water Level Measurements

The depth to groundwater was measured in the permanent wells at Range 29 on June 15, 2001, following procedures outlined in Section 4.18 of the SAP (IT, 2000b). Depth to groundwater was measured with an electronic water level meter. The meter probe and cable were cleaned between use at each well following decontamination methodology presented in Section 4.10 of the SAP (IT, 2000b). Measurements were referenced to the top of the PVC well casing. A summary of groundwater level measurements for Range 29 is presented in Table 3-4.

3.2.5 Groundwater Sampling

Groundwater samples were collected from four of the 16 monitoring wells (HR-87Q-MW05, HR-87Q-MW12, HR-87Q-MW14, and HR-87Q-MW15) installed at Range 29. The groundwater sampling locations are shown on Figure 3-1. The groundwater sampling locations and rationale are listed in Table 3-1. The groundwater sample designations and analytical parameters are listed in Table 3-5.

Table 3-4

Groundwater Elevations
Range 29, Former Weapons Demonstration Range, Parcel 87Q-X, Former Rifle Ranges,
Parcels 110Q and 111Q, and Former Impact Area, Parcel 239Q-X
Fort McClellan, Calhoun County, Alabama

Well Location	Date	Depth to Water (ft BTOC)	Top of Casing Elevation (ft amsl)	Ground Elevation (ft amsl)	Groundwater Elevation (ft amsl)
HR-87Q-MW01	15-Jun-01	NA	860.90	858.78	NA
HR-87Q-MW02	15-Jun-01	NA	848.95	846.83	NA
HR-87Q-MW03	15-Jun-01	NA	887.46	885.65	NA
HR-87Q-MW04	15-Jun-01	NA	887.56	885.61	NA
HR-87Q-MW05	15-Jun-01	34.36	891.65	889.76	857.29
HR-87Q-MW09	15-Jun-01	NA	872.72	870.89	NA
HR-87Q-MW10	15-Jun-01	NA	961.85	960.05	NA
HR-87Q-MW11	15-Jun-01	NA	970.04	968.16	NA
HR-87Q-MW12	15-Jun-01	24.10	895.50	893.45	871.4
HR-87Q-MW13	15-Jun-01	NA	1028.30	1026.42	NA
HR-87Q-MW14	15-Jun-01	35.90	920.49	918.41	907.45
HR-87Q-MW15	15-Jun-01	37.50	903.29	901.32	885.97
HR-87Q-MW16	15-Jun-01	NA	936.98	935.32	NA
HR-87Q-MW17	15-Jun-01	NA	926.36	924.58	NA
HR-87Q-MW18	15-Jun-01	NA	927.23	925.10	NA
HR-87Q-MW19	15-Jun-01	NA	849.67	847.79	NA

Elevations referenced to the North American Vertical Datum of 1988 (NAVD88).

BTOC - Below top of casing.
ft - Feet.
amsl - Above mean sea level.
NA - Not available, groundwater was not present in monitoring well.

Table 3-5

Groundwater Sample Designations and Analytical Parameters
Range 29, Former Weapons Demonstration Range, Parcel 87Q-X, Former Rifle Ranges,
Parcels 110Q and 111Q, and Former Impact Area, Parcel 239Q-X
Fort McClellan, Calhoun County, Alabama

Sample Location	Sample Designation	QA/QC Samples[a]			Analytical Suite
		Field Duplicates	Field Splits	MS/MSD	
HR-87Q-MW05	HR-87Q-MW05-GW-HL3006-REG				TAL Metals, Perchlorate, and Explosives.
	HR-87Q-MW05-GW-HL3006R-REG				CL Herbicides, CL Pesticides, and OP Pesticides.
HR-87Q-MW12	HR-87Q-MW12-GW-HL3013-REG				TCL VOCs, TCL SVOCs, CL Pesticides, PCBs, OP Pesticides, CL Herbicides, TAL Metals, Perchlorate, and Explosives.
HR-87Q-MW14	HR-87Q-MW14-GW-HL3017-REG				TAL Metals, Perchlorate, and Explosives.
	HR-87Q-MW14-GW-HL3017R-REG				CL Herbicides, CL Pesticides, and OP Pesticides.
HR-87Q-MW15	HR-87Q-MW15-GW-HL3018-REG				TAL Metals, Perchlorate, and Explosives.
	HR-87Q-MW15-GW-HL3018R-REG				CL Herbicides, CL Pesticides, and OP Pesticides.

*Groundwater samples were collected from the approximate midpoint of the saturated screened interval of the monitoring well.
[a] QA/QC samples specified in site-specific field sampling plan could not be collected because of limited water volume.

CL - Chlorinated.
MS/MSD - Matrix spike/matrix spike duplicate.
OP - Organophosphorus.
PCB - Polychlorinated biphenyl.
QA/QC - Quality assurance/quality control.
R - Resample.
REG - Field sample.
SVOC - Semivolatile organic compound.
TAL - Target analyte list.
TCL - Target compound list.
VOC - Volatile organic compound.

Twelve of the sixteen permanent wells installed at Range 29 were dry, or produced an insufficient volume of groundwater to collect a sample. Several attempts were made to collect groundwater samples from these wells, but all attempts were unsuccessful.

Monitoring wells HR-87Q-MW05, HR-87Q-MW14, and HR-87Q-MW15 were resampled for pesticide and herbicide analyses because pesticides and herbicides were detected in the groundwater sample from HR-87Q-MW12.

Sample Collection. Groundwater was purged from the monitoring wells using either a bladder pump or a peristaltic pump. Groundwater samples were collected using the pumps equipped with Teflon™ tubing, with the exception of HR-87Q-MW05, which was sampled using a Teflon bailer. Purging and sampling followed the procedures outlined in Section 4.9.1.4 of the SAP (IT, 2000b). Groundwater was sampled after purging a minimum of three well volumes and after field parameters (i.e., temperature, pH, dissolved oxygen, specific conductivity, oxidation-reduction potential, and turbidity) stabilized. Field parameters were measured using a calibrated water-quality meter. Field parameter readings are summarized in Table 3-6. Sample collection logs are included in Appendix A. The samples were analyzed for the parameters listed in Table 3-5 using methods outlined in Section 3.4.

3.2.6 Surface Water Sampling

One surface water sample was collected at Range 29, at the location shown on Figure 3-1. The surface water sampling location and rationale are listed in Table 3-1. The surface water sample designation and analytical parameters are listed in Table 3-7. The actual sampling location was determined in the field, based on drainage pathways and field observations.

Sample Collection. The surface water sample was collected in accordance with the procedures specified in Section 4.9.1.3 of the SAP (IT, 2000b). The surface water sample was collected by dipping a stainless-steel pitcher in the water then pouring the water into the sample containers, or by dipping the sample containers directly in the water and allowing the water to fill the sample containers. The surface water sample was collected after field parameters had been measured using a calibrated water-quality meter. Surface water field parameters are listed in Table 3-6. The sample collection log is included in Appendix A. The sample was analyzed for the parameters listed in Table 3-7 using methods outlined in Section 3.4.

Table 3-6

Groundwater and Surface Water Field Parameters
Range 29, Former Weapons Demonstration Range, Parcel 87Q-X, Former Rifle Ranges,
Parcels 110Q and 111Q, and Former Impact Area, Parcel 239Q-X
Fort McClellan, Calhoun County, Alabama

Sample Location	Sample Date	Media	Specific Conductivity (mS/cm)	Dissolved Oxygen (mg/L)	ORP (mV)	Temperature (°C)	Turbidity (NTU)	pH (SU)
HR-87Q-MW05	1-Jun-01	GW	0.392	7.94	363	17.10	>1000[a]	6.65
	31-Jul-01	GW	0.408	3.98	181	32.41	20	7.41
HR-87Q-MW12	22-May-01	GW	0.254	3.25	NR	18.60	75	5.27
HR-87Q-MW14	10-May-01	GW	0.095	6.25	205	15.73	6.6	5.55
	30-Jul-01	GW	0.181	3.14	142	22.20	5.7	6.69
HR-87Q-MW15	18-May-01	GW	0.327	5.22	198	16.85	7.6	7.09
	30-Jul-01	GW	0.312	14.77[b]	168	19.07	10.3	7.36
HR-87Q-SW/SD06	17-Jan-01	SW	0.394	1.42	280	11.80	0.00	5.96

[a]Estimated.
[b]Result artifically high due to air in flow-through sample cell.

°C - Degrees Celsius.
GW - Groundwater.
mg/L - Milligrams per liter.
mS/cm - Millisiemens per centimeter.
mV - Millivolts.
NR - Not recorded.
NTU - Nephelometric turbidity units.
ORP - Oxidation-reduction potential.
SU - Standard units.
SW - Surface water.

Table 3-7

Surface Water and Sediment Sample Designations and Analytical Parameters
Range 29, Former Weapons Demonstration Range, Parcel 87Q-X,
Former Rifle Ranges, Parcels 110Q and 111Q, and Former Impact Area, Parcel 239Q-X
Fort McClellan, Calhoun County, Alabama

Sample Location	Sample Designation	Sample Matrix	QA/QC Samples[a]			Analytical Suite
			Field Duplicates	Field Splits	MS/MSD	
HR-87Q-SW/SD06	HR-87Q-SW/SD06-SW-HL2006-REG	Surface Water				TAL Metals, Perchlorate, and Explosives (TOC and Grain Size for sediment only)
	HR-87Q-SW/SD06-SD-HL1006-REG	Sediment				

[a]No QA/QC samples specified in site-specific field sampling plan.

MS/MSD - Matrix spike/matrix spike duplicate.
N/A - Not applicable.
QA/QC - Quality assurance/quality control.
REG - Field sample.
TAL - Target analyte list.
TOC - Total organic carbon.

3.2.7 Sediment Sampling

One sediment sample was collected at the same location as the surface water sample, as shown on Figure 3-1. The sediment sampling location and rationale are presented in Table 3-1. The sediment sample designation and analytical parameters are listed in Table 3-7. The actual sediment sampling location was determined in the field, based on drainage pathways and field observations.

Sample Collection. The sediment sample was collected in accordance with the procedures specified in Section 4.9.1.2 of the SAP (IT, 2000b). Sediments were collected with a stainless-steel spoon and placed in a clean stainless-steel bowl. The sample was homogenized and placed in the appropriate sample containers. Sample collection logs are included in Appendix A. The sediment sample was analyzed for the parameters listed in Table 3-7 using methods outlined in Section 3.4.

3.3 Surveying of Sample Locations

Monitoring well and sample locations were surveyed using global positioning system survey techniques described in Section 4.3 of the SAP and conventional civil survey techniques described in Section 4.19 of the SAP (IT, 2000b). Horizontal coordinates were referenced to the U.S. State Plane Coordinate System, Alabama East Zone, North American Datum of 1983. Elevations were referenced to the North American Vertical Datum of 1988. Horizontal coordinates and elevations are included in Appendix D.

3.4 Analytical Program

Samples collected during the SI were analyzed for various chemical parameters based on potential site-specific chemicals and on EPA, ADEM, FTMC, and USACE requirements. All samples collected at Range 29 were analyzed for the following parameters:

- Target analyte list metals – EPA Method 6010B/7000
- Nitroaromatic and nitramine explosives – EPA Method 8330
- Perchlorate – EPA Method 314.

In addition, the sediment sample and four depositional soil samples were analyzed for the following parameters:

- Total organic carbon (TOC) – EPA Method 9060
- Grain Size – American Society for Testing and Materials D-421/D-422.

Soil and groundwater samples collected from sample location HR-87Q-MW12, downgradient from the possible fill area, were analyzed for the following additional parameters:

- Chlorinated herbicides – EPA Method 8151A
- Chlorinated pesticides – EPA Method 8081A
- Organophosphorus pesticides – EPA Method 8141A
- Target compound list (TCL) VOCs – EPA Method 8260B
- TCL semivolatile organic compounds (SVOC) – EPA Method 8270C
- Polychlorinated biphenyls (PCB) – EPA Method 8082.

Soil samples collected at HR-87Q-MW19, located near the Weapons Cleaning Area, were additionally analyzed for:

- Target compound list VOCs – EPA Method 8260B.

Groundwater sample locations HR-87Q-MW05, HR-87Q-MW14, and HR-87Q-MW15 were resampled for the following additional parameters:

- Chlorinated herbicides – EPA Method 8151
- Chlorinated pesticides – EPA Method 8081A
- Organophosphorus pesticides – EPA Method 8141A.

The samples were analyzed using EPA SW-846 methods, including Update III Methods where applicable, as presented in Table 6-1 in Appendix B of the SAP (IT, 2000b).

3.5 Sample Preservation, Packaging, and Shipping

Sample preservation, packaging, and shipping followed requirements specified in Section 4.13.2 of the SAP (IT, 2000b). Sample containers, sample volumes, preservatives, and holding times for the analyses required in this SI are listed in Table 5-1 of Appendix B of the SAP (IT, 2000b). Sample documentation and chain-of-custody records were completed as specified in Section 4.13 of the SAP (IT, 2000b).

Completed analysis request and chain-of-custody records (Appendix A) were secured and included with each shipment of sample coolers to EMAX Laboratories, Inc. in Torrance, California. Split samples were shipped to USACE South Atlantic Division Laboratory in Marietta, Georgia.

3.6 Investigation-Derived Waste Management and Disposal

Investigation-derived waste (IDW) was managed and disposed as outlined in Appendix D of the SAP (IT, 2000b). The IDW generated during the SI at Range 29 was segregated as follows:

- Drill cuttings
- Purge water from well development, sampling activities, and decontamination fluids
- Personal protective equipment (PPE).

Solid IDW was stored inside the fenced area surrounding Buildings 335 and 336 in lined roll-off bins prior to characterization and final disposal. Solid IDW was characterized using toxicity characteristic leaching procedure analyses. Based on the results, drill cuttings and PPE generated during the SI at Range 29 were disposed as nonregulated waste at the Industrial Waste Landfill on the Main Post of FTMC.

Liquid IDW was contained in the 20,000-gallon sump associated with the Building T-338 vehicle washrack. Liquid IDW was characterized by VOC, SVOC, and metals analyses. Based on the analyses, liquid IDW was discharged as nonregulated waste to the FTMC wastewater treatment plant on the Main Post.

3.7 Variances/Nonconformances

Twelve variances and one nonconformance to the SFSP were recorded during completion of the SI at Range 29. The variances and nonconformance to the SFSP are summarized in Table 3-8 and included in Appendix E.

3.8 Data Quality

The field sample analytical data are presented in tabular form in Appendix F. The field samples were collected, documented, handled, analyzed, and reported in a manner consistent with the SI work plan; the FTMC SAP and installation-wide quality assurance plan; and standard, accepted methods and procedures. Data were reported and evaluated in accordance with Corps of Engineers South Atlantic Savannah Level B criteria (USACE, 1994) and the stipulated requirements for the generation of definitive data (Section 3.1.2 of Appendix B of the SAP [IT, 2000b]). Chemical data were reported via hard-copy data packages by the laboratory using Contract Laboratory Program-like forms.

Table 3-8

Variances and Nonconformance to the Site-Specific Field Sampling Plan
Range 29, Former Weapons Demonstration Range, Parcel 87Q-X, Former Rifle Ranges,
Parcels 110Q and 111Q, and Former Impact Area, Parcel 239Q-X
Fort McClellan, Calhoun County, Alabama

Variances to the SFSP	Justification for Variance	Impact to Site Investigation
Permanent residuum monitoring wells HR-87Q-MW01, HR-87Q-MW02, HR-87Q-MW09, and HR-87Q-MW19 were installed using air-rotary drilling techniques.	Hollow-stem auger refusal was encountered and groundwater was not present during drilling activities; therefore, the wells were installed using air-rotary drilling techniques.	None. Drilling with air-rotary allowed successful installation of the wells.
Permanent residuum monitoring well HR-87Q-MW17 was moved approximately 90 feet west of its proposed location and approximately 40 feet west of the direct-push soil sample location HR-87Q-MW17.	The direct-push drill rig and hollow-stem auger drill rig could not access the proposed location because of steep, unsafe terrain.	None.
Permanent residuum monitoring well HR-87Q-MW18 was moved approximately 200 feet west of its proposed location.	The direct-push drill rig and hollow-stem auger drill rig could not access the proposed location because of steep, unsafe terrain.	None.
Groundwater samples were not collected from twelve monitoring wells: HR-87Q-MW01, HR-87Q-MW02, HR-87Q-MW03, HR-87Q-MW04, HR-87Q-MW09, HR-87Q-MW10, HR-87Q-MW11, HR-87Q-MW13, HR-87Q-MW16, HR-87Q-MW17, HR-87Q-MW18, and HR-87Q-MW19.	Groundwater samples could not be collected from the monitoring wells because the wells were dry or there was not enough water to collect a sample.	Although the SI was not completed as planned, the data collected at other locations indicates the presence of contamination, therefore, a remedial investigation will be required.

Table 3-8

Variances and Nonconformance to the Site-Specific Field Sampling Plan
Range 29, Former Weapons Demonstration Range, Parcel 87Q-X, Former Rifle Ranges,
Parcels 110Q and 111Q, and Former Impact Area, Parcel 239Q-X
Fort McClellan, Calhoun County, Alabama

Variances to the SFSP	Justification for Variance	Impact to Site Investigation
Groundwater sample locations HR-87Q-MW05, HR-87Q-MW14, and HR-87Q-MW15 were resampled for the analysis of chlorinated herbicides, chlorinated pesticides, and organophosphorus pesticides.	Chlorinated herbicides and chlorinated pesticides were detected in the groundwater sample collected from well HR-87Q-MW12 at concentrations exceeding SSSLs; therefore, the remaining groundwater sample locations were resampled to determine the presence or absence of contamination.	None. The additional analyses provided supplemental data to assess site conditions.
Proposed surface water and sediment sample HR-87Q-SW/SD01 was not collected. Depositional soil sample HR-87Q-DEP05 was collected approximately 200 feet northwest of the proposed surface water and sediment sample location.	Surface water and sediment were not present at the proposed sample location.	None. The depositional soil sample was collected to determine the presence or absence of contamination.
Proposed surface water and sediment sample HR-87Q-SW/SD02 was not collected. Depositional soil sample HR-87Q-DEP01 was collected approximately 600 feet west of the proposed surface water and sediment sample location.	Surface water and sediment were not present at the proposed sample location.	None. The depositional soil sample was collected to determine the presence or absence of contamination.
Proposed surface water and sediment sample HR-87Q-SW/SD03 was not collected. Depositional soil sample HR-87Q-DEP02 was collected in place of the surface water and sediment sample.	Surface water and sediment were not present at the proposed sample location.	None. The depositional soil sample was collected to determine the presence or absence of contamination.

Table 3-8

Variances and Nonconformance to the Site-Specific Field Sampling Plan
Range 29, Former Weapons Demonstration Range, Parcel 87Q-X, Former Rifle Ranges,
Parcels 110Q and 111Q, and Former Impact Area, Parcel 239Q-X
Fort McClellan, Calhoun County, Alabama

Variances to the SFSP	Justification for Variance	Impact to Site Investigation
Proposed surface water and sediment sample HR-87Q-SW/SD04 was not collected. Depositional soil sample HR-87Q-DEP04 was collected approximately 200 feet southeast of the proposed surface water and sediment sample location.	Surface water and sediment were not present at the proposed sample location.	None. The depositional soil sample was collected to determine the presence or absence of contamination.
Proposed surface water and sediment sample HR-87Q-SW/SD05 was not collected. Depositional soil sample HR-87Q-DEP06 was collected in place of the surface water and sediment sample.	Surface water and sediment were not present at the proposed sample location.	None. The depositional soil sample was collected to determine the presence or absence of contamination.
Proposed surface water and sediment sample HR-87Q-SW/SD07 was not collected. Depositional soil sample HR-87Q-DEP07 was collected in place of the surface water and sediment sample.	Surface water and sediment were not present at the proposed sample location.	None. The depositional soil sample was collected to determine the presence or absence of contamination.
Proposed surface water and sediment sample HR-87Q-SW/SD08 was not collected. Depositional soil sample HR-87Q-DEP03 was collected in place of the surface water and sediment sample.	Surface water and sediment were not present at the proposed sample location.	None. The depositional soil sample was collected to determine the presence or absence of contamination.
Nonconformance to the SFSP	**Justification for Nonconformance**	**Impact to Site Investigation**
Proposed surface soil, subsurface soil, and groundwater samples HR-87Q-MW06, HR-87Q-MW07, HR-87Q-MW08, and HR-87Q-MW20 were not collected.	The IT UXO field technicians were not able to provide a safe access corridor for the drill rig.	The data collected at other locations indicate the presence of contamination, therefore an RI will be completed at this site in the future.

Data Validation. The reported analytical data were validated in accordance with EPA National Functional Guidelines by Level III criteria. Appendix G consists of a data validation summary report that discusses the results of the validation. Selected results were rejected or otherwise qualified based on the implementation of accepted data validation procedures and practices. These qualified parameters are highlighted in the report. The validation-assigned qualifiers were added to the FTMC IT Environmental Management System (ITEMS™) database for tracking and reporting. The qualified data were used in comparing to the SSSLs and ESVs developed by IT. Rejected data (assigned an "R" qualifier) were not used in comparison to the SSSLs and ESVs. The data presented in this report, except where qualified, meets the principle data quality objective for this SI.

4.0 Site Characterization

Subsurface investigations performed at Range 29, provided soil, bedrock, and groundwater data used to characterize the geology and hydrogeology of the site.

4.1 Regional and Site Geology

4.1.1 Regional Geology

Calhoun County includes parts of two physiographic provinces, the Piedmont Upland Province and the Valley and Ridge Province. The Piedmont Upland Province occupies the extreme eastern and southeastern portions of the county and is characterized by metamorphosed sedimentary rocks. The generally accepted range in age of these metamorphics is Cambrian to Devonian.

The majority of Calhoun County, including the Main Post of FTMC, lies within the Appalachian fold and thrust structural belt (Valley and Ridge Province) where southeastward-dipping thrust faults with associated minor folding are the predominant structural features. The fold-and-thrust belt consists of Paleozoic sedimentary rocks that have been asymmetrically folded and thrust-faulted with major structures and faults striking in a northeast-southwest direction. North-westward transport of the Paleozoic rock sequence along the thrust faults has resulted in the imbricate stacking of large slabs of rock referred to as thrust sheets. Within an individual thrust sheet, smaller faults may splay off the larger thrust fault, resulting in imbricate stacking of rock units within an individual thrust sheet (Osborne and Szabo, 1984). Geologic contacts in this region generally strike parallel to the faults and repetition of lithologic units is common in vertical sequences. Geologic formations within the Valley and Ridge Province portion of Calhoun County have been mapped by Warman and Causey (1962), Osborne and Szabo (1984), and Moser and DeJarnette (1992), and vary in age from Lower Cambrian to Pennsylvanian.

The basal unit of the sedimentary sequence in Calhoun County is the Cambrian Chilhowee Group. The Chilhowee Group is comprised of the Cochran, Nichols, Wilson Ridge, and Weisner Formations (Osborne and Szabo, 1984), but in Calhoun County is either undifferentiated or divided into the Cochran and Nichols Formations and an upper undifferentiated Wilson Ridge and Weisner Formation. The Cochran is composed of poorly sorted arkosic sandstone and conglomerate with interbeds of greenish-gray siltstone and mudstone. Massive to laminated, greenish-gray and black mudstone makes up the Nichols Formation with thin interbeds of siltstone and very fine-grained sandstone (Szabo et al., 1988). These two formations are mapped only in the eastern part of the county.

The Wilson Ridge and Weisner Formations are undifferentiated in Calhoun County and consist of both coarse-grained and fine-grained clastics. The coarse-grained facies appear to dominate the unit and consist primarily of coarse-grained, vitreous quartzite, and friable, fine- to coarse-grained, orthoquartzitic sandstone, both of which locally contain conglomerate. The fine-grained facies consist of sandy and micaceous shale and silty, micaceous mudstone which are locally interbedded with the coarse clastic rocks. The abundance of orthoquartzitic sandstone and quartzite suggests that most of the Chilhowee Group bedrock in the vicinity of FTMC belongs to the Weisner Formation (Osborne and Szabo, 1984).

The Cambrian Shady Dolomite overlies the Weisner Formation northeast, east and southwest of the Main Post and consists of interlayered bluish-gray or pale yellowish-gray sandy dolomitic limestone and siliceous dolomite with coarsely crystalline porous chert (Osborne et al., 1989). A variegated shale and clayey silt have been included within the lower part of the Shady Dolomite (Cloud, 1966). Material similar to this lower shale unit was noted in core holes drilled by the Alabama Geologic Survey on FTMC (Osborne and Szabo, 1984). The character of the Shady Dolomite in the FTMC vicinity and the true assignment of the shale at this stratigraphic interval are still uncertain (Osborne, 1999).

The Rome Formation overlies the Shady Dolomite and locally occurs to the northwest and southwest of the Main Post as mapped by Warman and Causey (1962) and Osborne and Szabo (1984). The Rome Formation consists of variegated thinly interbedded grayish-red-purple mudstone, shale, siltstone, and greenish-red and light gray sandstone, with locally occurring limestone and dolomite. The Conasauga Formation overlies the Rome Formation and occurs along anticlinal axes in the northeastern portion of Pelham Range (Warman and Causey, 1962), (Osborne and Szabo, 1984) and the northern portion of the Main Post (Osborne et al., 1997). The Conasauga Formation is composed of dark-gray, finely to coarsely crystalline medium- to thick-bedded dolomite with minor shale and chert (Osborne et al., 1989).

Overlying the Conasauga Formation is the Knox Group, which is composed of the Copper Ridge and Chepultepec dolomites of Cambro-Ordovician age. The Knox Group is undifferentiated in Calhoun County and consists of light medium gray, fine to medium crystalline, variably bedded to laminated, siliceous dolomite and dolomitic limestone that weathers to a chert residuum (Osborne and Szabo, 1984). The Knox Group underlies a large portion of the Pelham Range area.

The Ordovician Newala and Little Oak Limestones overlie the Knox Group. The Newala Limestone consists of light to dark gray, micritic, thick-bedded limestone with minor dolomite.

The Little Oak Limestone is comprised of dark gray, medium- to thick-bedded, fossiliferous, argillaceous to silty limestone with chert nodules. These limestone units are mapped together as undifferentiated at FTMC and other parts of Calhoun County. The Athens Shale overlies the Ordovician limestone units. The Athens Shale consists of dark-gray to black shale and graptolitic shale with localized interbedded dark gray limestone (Osborne et al., 1989). These units occur within an eroded "window" in the uppermost structural thrust sheet at FTMC and underlie much of the developed area of the Main Post.

Other Ordovician-aged bedrock units mapped in Calhoun County include the Greensport Formation, Colvin Mountain Sandstone, and Sequatchie Formation. These units consist of various siltstones, sandstones, shales, dolomites and limestones, and are mapped as one, undifferentiated unit in some areas of Calhoun County. The only Silurian-age sedimentary formation mapped in Calhoun County is the Red Mountain Formation. This unit consists of interbedded red sandstone, siltstone, and shale with greenish-gray to red silty and sandy limestone.

The Devonian Frog Mountain Sandstone consists of sandstone and quartzitic sandstone with shale interbeds, dolomudstone, and glauconitic limestone (Szabo et al., 1988). This unit locally occurs in the western portion of Pelham Range.

The Mississippian Fort Payne Chert and the Maury Formation overlie the Frog Mountain Sandstone and are composed of dark- to light-gray limestone with abundant chert nodules and greenish-gray to grayish-red phosphatic shale with increasing amounts of calcareous chert toward the upper portion of the formation (Osborne and Szabo, 1984). These units occur in the northwestern portion of Pelham Range. Overlying the Fort Payne Chert is the Floyd Shale, also of Mississippian age, which consists of thin-bedded, fissile brown to black shale with thin intercalated limestone layers and interbedded sandstone. Osborne and Szabo (1984) reassigned the Floyd Shale, which was mapped by Warman and Causey (1962) on the Main Post of FTMC, to the Ordovician Athens Shale on the basis of fossil data.

The Jacksonville Thrust Fault is the most significant structural geologic feature in the vicinity of FTMC, both for its role in determining the stratigraphic relationships in the area and for its contribution to regional water supplies. The trace of the fault extends northeastward for approximately 39 miles between Bynum, Alabama and Piedmont, Alabama. The fault is interpreted as a major splay of the Pell City Fault (Osborne and Szabo, 1984). The Ordovician sequence comprising the Eden thrust sheet is exposed at FTMC through an eroded "window" or

"fenster" in the overlying thrust sheet. Rocks within the window display complex folding with the folds being overturned, and tight to isoclinal. The carbonates and shales locally exhibit well-developed cleavage (Osborne and Szabo, 1984). The FTMC window is framed on the northwest by the Rome Formation, north by the Conasauga Formation, northeast, east, and southwest by the Shady Dolomite, and southeast and southwest by the Chilhowee Group (Osborne et al., 1997).

4.1.2 Site Geology

Soils on the western portion of Range 29 are mapped as the Anniston and Allen gravelly loams, 6 to 10 percent slopes, eroded (AcC2) (U.S. Department of Agriculture, 1961). Some severely eroded areas may be common on the surface for this soil type, as well as a few shallow gullies. The typical soil description is 2 to 10 feet of well-drained stony loam to clay loam over stratified local alluvium, limestone, or shale bedrock.

Soils on the eastern portion of Range 29 are mapped as the Anniston and Allen stony loams, 10 to 25 percent slopes (AdE) (U.S. Department of Agriculture, 1961). The surface soil of this mapping unit is very dark brown to very dark grayish-brown stony loam, 4 to 8 inches thick. Severely eroded areas are less common for this soil type. At a depth of about 10 inches, this material grades in a dark red, or dark reddish-brown stony fine sandy clay loam. This mapping unit consists of friable soils that have developed in old alluvium on foot slopes and along the base of mountains. The texture of subsoil ranges from light clay loam to clay or silty clay loam. Infiltration and runoff are medium, permeability is moderate, and the capacity for available moisture is high. Organic matter is moderately low.

As shown on the site geologic map (Figure 4-1), Range 29 is situated on the southeastern boundary of the Ordovician window in the uppermost structural thrust sheet. The basal unit of the stratigraphic sequence, the Cambrian Chilhowee Group, has been thrust over the younger Ordovician Little Oak and Newala Limestone, undifferentiated, and the Mississippian/ Ordovician Floyd and Athens Shale, undifferentiated. Through erosion of the Cambrian Chilhowee Group, the younger units have been exposed, forming a geologic window. Within the parcel boundary, the northwestern half of Range 29 is mapped as the Ordovician Little Oak and Newala Limestone, undifferentiated. The eastern half of the parcel is bisected by the Jacksonville Fault, which frames the geologic window, separating the Mississippian/Ordovician Floyd and Athens Shale, undifferentiated from the Cambrian Chilhowee Group.

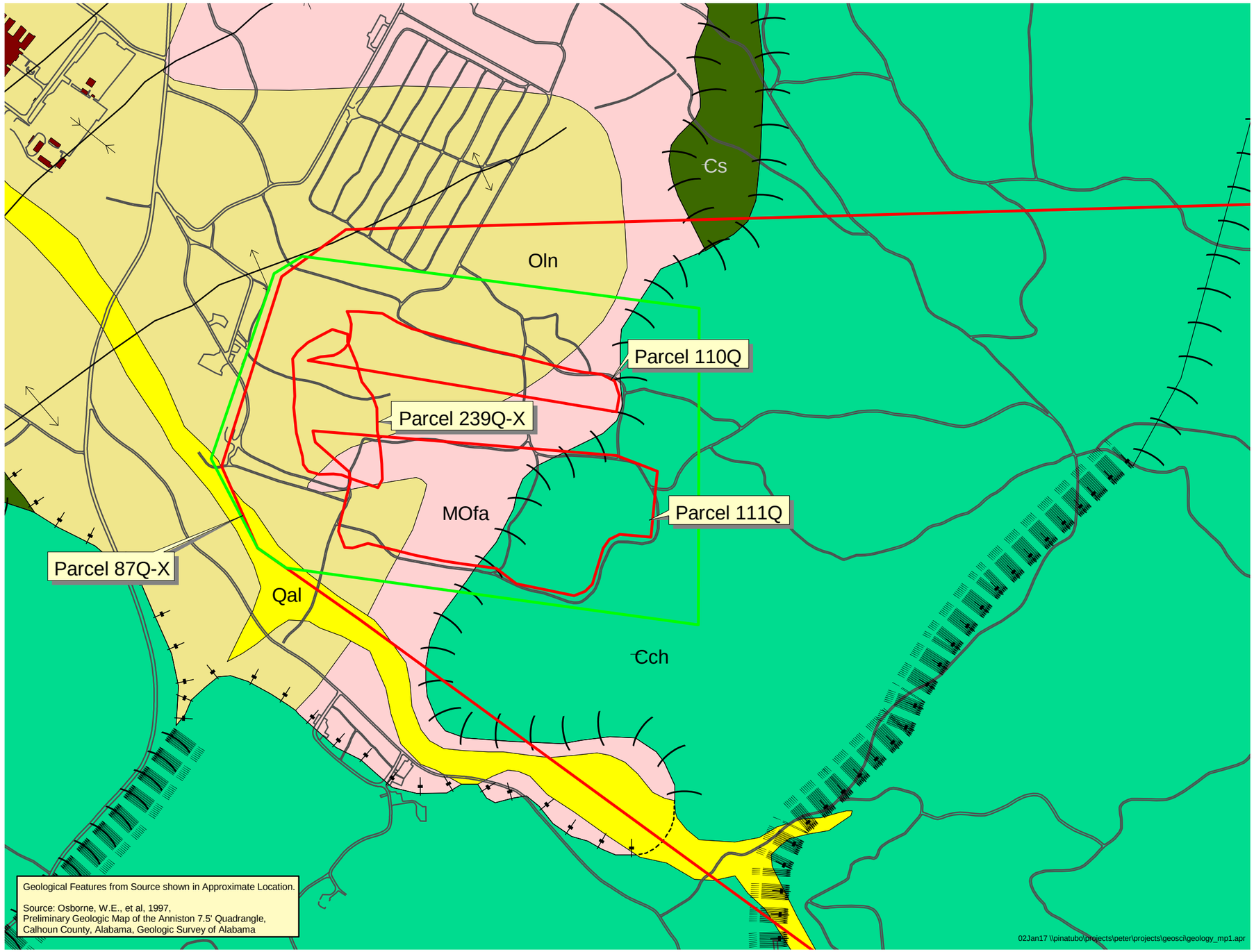


Figure 4-1

Site Geologic Map
Range 29, Former Weapons Demonstration Range,
Parcel 87Q-X, Former Rifle Ranges, Parcels 110Q and 111Q,
and Former Impact Area,
Parcel 239Q-X

- Roads
- Thrust Fault (dashed where inferred)
- Geologic Contact
- Anticline
- Syncline
- Area of Investigation
- Non-CERCLA Parcels
- Buildings

Geology

Qal	Quaternary - alluvium
MOfa	Mississippian/Ordovician - Floyd & Athens Shale, Undifferentiated
Oln	Ordovician - Little Oak and Newala Limestones, Undifferentiated
Cs	Cambrian - Shady Dolomite
Cch	Cambrian - Chilhowee Group

0 750 1500

Alabama State Plane feet

January 2002

Fort McClellan
Environmental Office

N

U.S. Army Corps of Engineers
Mobile District
Fort McClellan
Calhoun County, Alabama
Contract No. DACA21-96-D-0018

IT CORPORATION

A geologic cross section was constructed based on the lithologic descriptions and boring log data from the central portion of Range 29 and is presented on Figure 4-2. The cross section location is shown on Figure 4-3. As shown on Figure 4-2, DPT and hollow-stem auger boring data collected during the SI indicate that residuum at the central portion of the site consists of predominantly silty and sandy clay overlying limestone. Hollow-stem auger refusal was encountered on competent bedrock at depths ranging from 10 to 65.5 feet bgs at Range 29. Hollow-stem auger refusal occurred on limestone in nine borings (HR-87Q-MW01, HR-87Q-MW02, HR-87Q-MW05, HR-87Q-MW10, HR-87Q-MW11, HR-87Q-MW13, HR-87Q-MW16, HR-87Q-MW18, and HR-87Q-MW19) at depths ranging from 10 to 65.5 feet bgs. Although not shown on Figure 4-2, sandstone was encountered in HR-87Q-MW09 in the southwest portion of Range 29 at a depth of 21.5 feet bgs, and shale occurred between 23 and 27 feet bgs at HR-87Q-MW03 and HR-87Q-MW04 in the south-central portion of Range 29 (Appendix B).

4.2 Site Hydrology

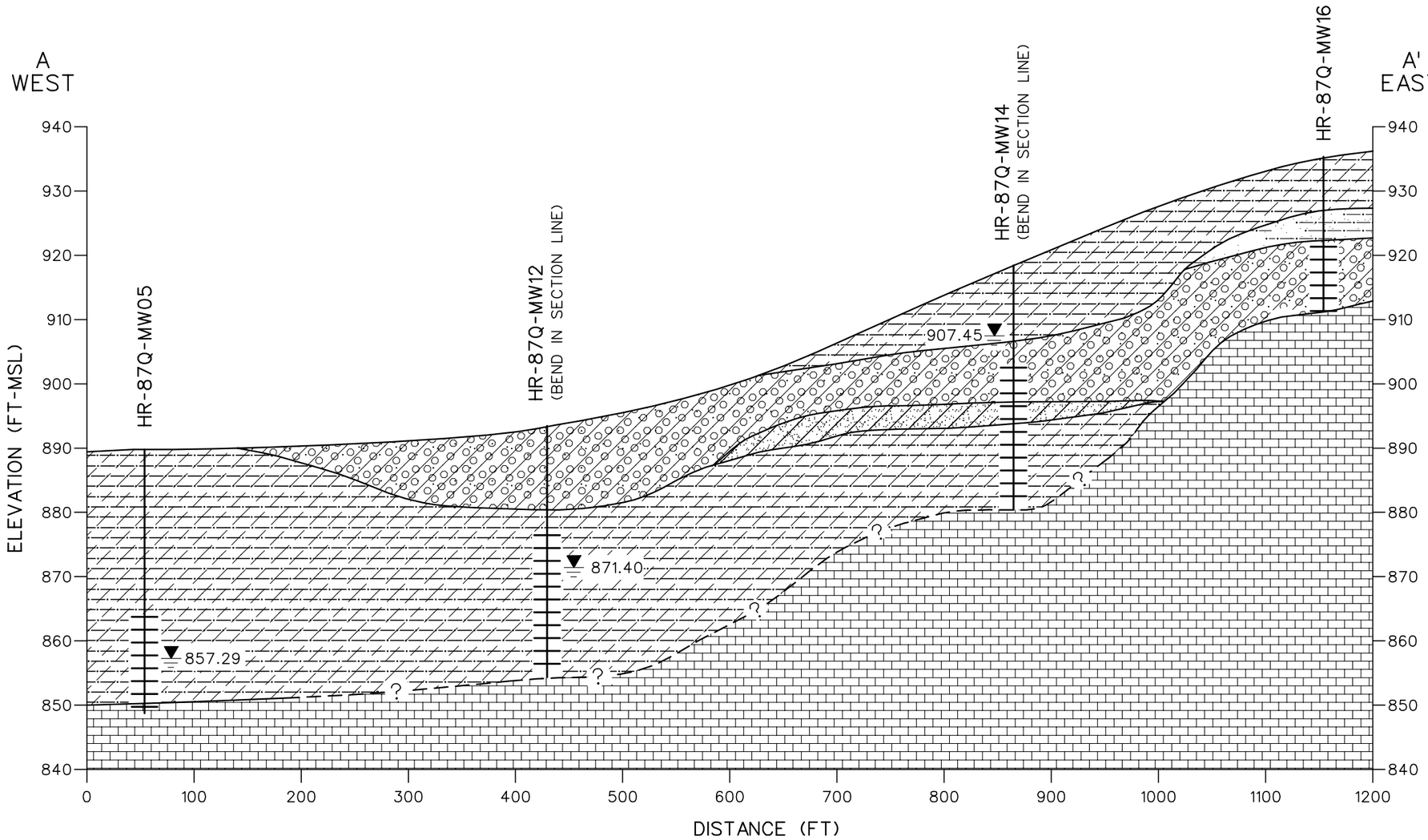
4.2.1 Surface Hydrology

Precipitation in the form of rainfall averages about 53 inches annually in Anniston, Alabama, with infiltration rates annually exceeding evapotranspiration rates (U.S. Department of Commerce, 1998). The major surface water features at the Main Post of FTMC include Remount Creek, Cane Creek, and Cave Creek. These waterways flow in a general northwest to westerly direction towards the Coosa River on the western boundary of Calhoun County.

Surface hydrology at the site consists of three intermittent streams. One stream originates near the southeast corner of the parcel boundary and flows northwest across the site joining another intermittent stream in the northwestern portion of the site (Figure 4-3). A third stream originates near the southwest corner of the parcel, flowing south into South Branch of Cane Creek.

4.2.2 Hydrogeology

The static groundwater levels were measured in four of the permanent wells installed at Range 29 on June 15, 2001, as summarized in Table 3-4. The remaining wells were observed to be dry. A groundwater elevation map was constructed from the June 2001 data and is shown on Figure 4-4. Groundwater flow at the site follows the general topography and flows to the west-northwest.



LEGEND

- SCREEN INTERVAL
- WATER TABLE (JUNE 15, 2001)
- 857.29 GROUNDWATER ELEVATION (FT MSL)
- CLAY, SOME GRAVEL TRACE SAND
- SILT, SOME SANDSTONE
- SILTY CLAY
- CLAY, TRACE SAND
- LIMESTONE
- - — ? — - CONTACT DASHED WHERE INFERRED

NOTES:

1. ELEVATIONS ARE REFERENCED TO THE NORTH AMERICAN VERTICAL DATUM OF 1988.
2. SEE FIGURE 4-3 FOR CROSS SECTION LOCATION.

HORIZONTAL

0 120 240 FEET

FIGURE 4-2
GEOLOGIC CROSS SECTION A-A'
RANGE 29
FORMER WEAPONS DEMONSTRATION RANGE, PARCEL 87Q-X, FORMER RIFLE RANGES PARCELS 110Q AND 111Q, AND FORMER IMPACT AREA PARCEL 239Q-X

U. S. ARMY CORPS OF ENGINEERS
MOBILE DISTRICT
FORT McCLELLAN
CALHOUN COUNTY, ALABAMA
Contract No. DACA21-96-D-0018

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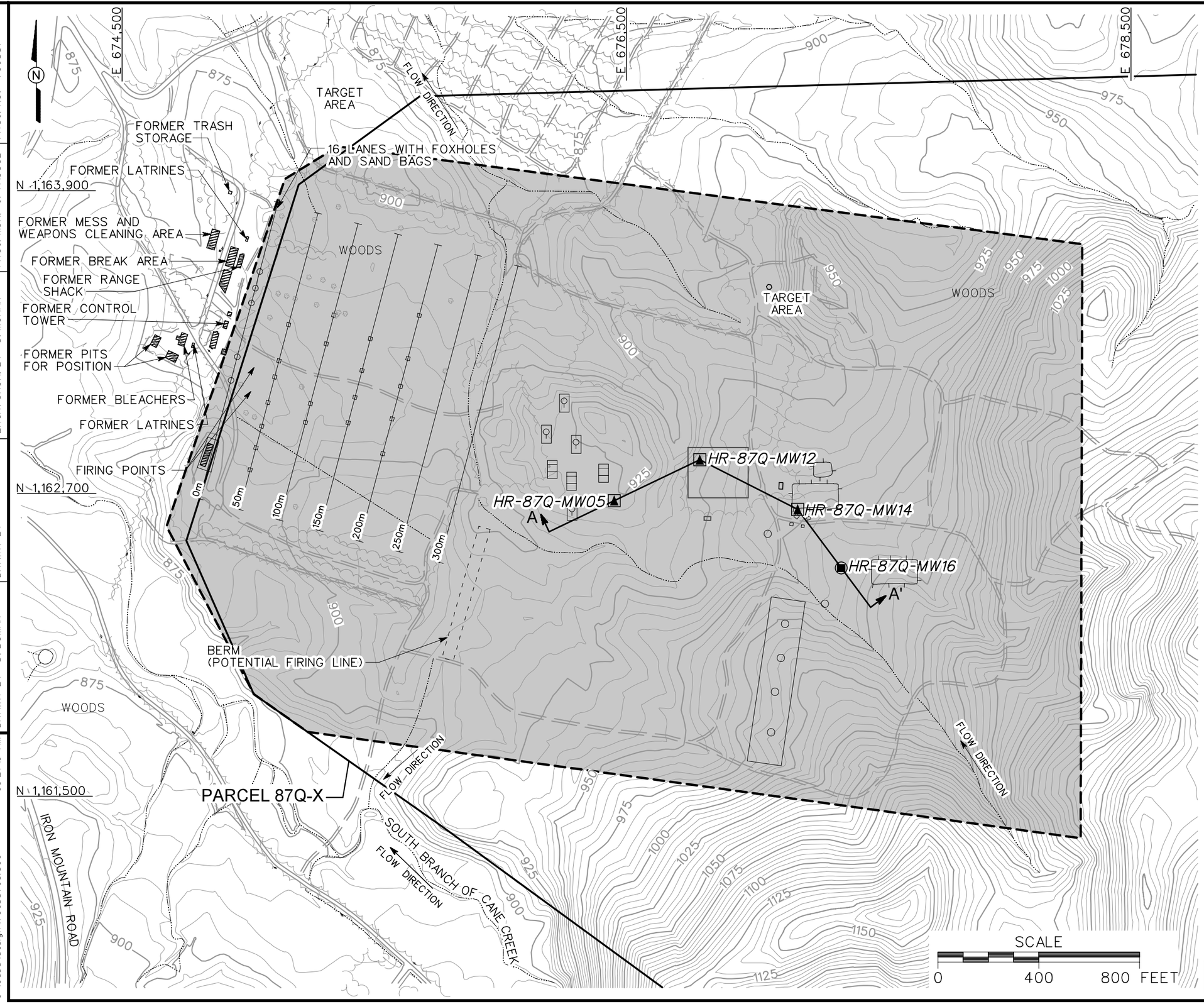
STARTING DATE: 12/11/01
DRAWN BY: D. BOMAR
DRAFT. CHCK. BY:
ENGR. CHCK. BY: S. MORAN
INITIATOR: L. O'HARE
PROJ. MGR.: J. YACOUB
DWG. NO.: ...\796887es.266
PROJ. NO.: 796887
DATE LAST REV.:
DRAWN BY:



LEGEND

- UNIMPROVED ROADS AND PARKING
- PAVED ROADS AND PARKING
- REMOVED BUILDINGS
- TOPOGRAPHIC CONTOURS (CONTOUR INTERVAL - 5 FOOT)
- TREES / TREELINE
- PARCEL BOUNDARY
- AREA OF INVESTIGATION
- SURFACE DRAINAGE / CULVERT
- UTILITY POLE
- MOUNDS
- CONCRETE PAD FOR FORMER POP-UP TARGETS
- RESIDUUM MONITORING WELL/ SURFACE AND SUBSURFACE SOIL SAMPLE LOCATION
- GROUNDWATER, SURFACE AND SUBSURFACE SOIL SAMPLE LOCATION
- A A' CROSS SECTION LOCATION

SCALE
0 400 800 FEET

FIGURE 4-3
GEOLOGIC CROSS SECTION
LOCATION MAP
RANGE 29
FORMER WEAPONS DEMONSTRATION
RANGE, PARCEL 87Q-X,
FORMER RIFLE RANGES
PARCELS 110Q AND 111Q, AND
FORMER IMPACT AREA
PARCEL 239Q-X

U. S. ARMY CORPS OF ENGINEERS
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FORT McCLELLAN
CALHOUN COUNTY, ALABAMA
Contract No. DACA21-96-D-0018

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STARTING DATE: 01/14/02
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DATE LAST REV.:
DRAFT. CHCK. BY:
ENGR. CHCK. BY: S. MORAN
PROJ. MGR.: J. YACOUB
INITIATOR: T. WINTON
PROJ. NO.: 796887
DWG. NO.: ...\796887es.300

E 674,500
E 676,500
E 678,500
N 1,163,900
N 1,162,700
N 1,161,500
TARGET AREA
FLOW DIRECTION
16 LANES WITH FOXHOLES AND SAND BAGS
FORMER TRASH STORAGE
FORMER LATRINES
FORMER MESS AND WEAPONS CLEANING AREA
FORMER RANGE SHACK
FORMER CONTROL TOWER
FORMER PITS FOR POSITION
FORMER BLEACHERS
FORMER LATRINES
FIRING POINTS
0m
50m
100m
150m
200m
250m
300m
WOODS
HR-87Q-MW19 (DRY)
HR-87Q-MW01 (DRY)
HR-87Q-MW02 (DRY)
HR-87Q-MW15 (885.97)
HR-87Q-MW12 (871.40)
HR-87Q-MW18 (DRY)
HR-87Q-MW17 (DRY)
HR-87Q-MW05 (857.29)
HR-87Q-MW14 (907.45)
HR-87Q-MW16 (DRY)
HR-87Q-MW04 (DRY)
HR-87Q-MW09 (DRY)
HR-87Q-MW03 (DRY)
HR-87Q-MW11 (DRY)
HR-87Q-MW10 (DRY)
HR-87Q-MW13 (DRY)
G.W. FLOW
BERM (POTENTIAL FIRING LINE)
PARCEL 87Q-X
IRON MOUNTAIN ROAD
SOUTH BRANCH OF CANE CREEK
875
900
925
950
975
1000
1025
1050
1075
1100
1125
1150
860
870
880
890

LEGEND

- UNIMPROVED ROADS AND PARKING
- PAVED ROADS AND PARKING
- REMOVED BUILDINGS
- TOPOGRAPHIC CONTOURS (CONTOUR INTERVAL - 25 FOOT)
- GROUNDWATER ELEVATION CONTOUR (DASHED WHERE INFERRED)
- (907.45) GROUNDWATER ELEVATION (FT MSL) (JUNE 15, 2001)
- G.W. FLOW GROUNDWATER FLOW DIRECTION
- TREES / TREELINE
- PARCEL BOUNDARY
- AREA OF INVESTIGATION
- SURFACE DRAINAGE / CULVERT
- UTILITY POLE
- CONCRETE PAD FOR FORMER POP-UP TARGETS
- RESIDUUM MONITORING WELL\ SURFACE AND SUBSURFACE SOIL SAMPLE LOCATION
- GROUNDWATER, SURFACE AND SUBSURFACE SOIL SAMPLE LOCATION

SCALE
0 400 800 FEET

FIGURE 4-4
GROUNDWATER ELEVATION MAP
RANGE 29
FORMER WEAPONS DEMONSTRATION RANGE, PARCEL 87Q-X,
FORMER RIFLE RANGES
PARCELS 110Q AND 111Q, AND
FORMER IMPACT AREA
PARCEL 239Q-X

U. S. ARMY CORPS OF ENGINEERS
MOBILE DISTRICT
FORT McCLELLAN
CALHOUN COUNTY, ALABAMA
Contract No. DACA21-96-D-0018

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DRAWN BY: D. BOMAR
STARTING DATE: 10/29/01
DATE LAST REV.:
DRAWN BY:
DRAFT. CHCK. BY:
ENGR. CHCK. BY: S. MORAN
INITIATOR: L. O'HARE
PROJ. MGR.: J. YACOUB
PROJ. NO.: 796887
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5.0 Summary of Analytical Results

The results of the chemical analysis of samples collected at Range 29 indicate that metals, VOCs, pesticides, herbicides, perchlorate, and explosives were detected in site media. SVOCs and PCBs were not detected in any of the samples collected. To evaluate whether the detected constituents present an unacceptable risk to human health and the environment, the analytical results were compared to the human health SSSLs and ESVs for FTMC. The SSSLs and ESVs were developed by IT for human health and ecological risk evaluations as part of the on-going SIs being performed under the BRAC Environmental Restoration Program at FTMC.

Metals concentrations exceeding the SSSLs and ESVs were subsequently compared to metals background screening values to determine if the metals concentrations are within natural background concentrations (SAIC, 1998). Summary statistics for background metals samples collected at FTMC are included in Appendix H.

The following sections and Tables 5-1 through 5-5 summarize the results of the comparison of detected constituents to the SSSLs, ESVs, and background screening values. Complete analytical results are presented in Appendix F.

5.1 Surface and Depositional Soil Analytical Results

Twenty-six surface soil samples and seven depositional soil samples were collected for chemical analysis at Range 29. Surface and depositional soil samples were collected from the upper 1-foot of soil at the locations shown on Figure 3-1. Metals, VOCs, herbicides, and perchlorate were detected in surface and depositional soils. Analytical results were compared to residential human health SSSLs, ESVs, and metals background screening values as presented in Table 5-1.

Metals. Twenty-two metals were detected in surface and depositional soil samples collected at Range 29. The concentrations of seven metals exceeded SSSLs and their respective background concentrations: aluminum (at five locations), antimony (nine locations), arsenic (four locations), chromium (HR-87Q-DEP01 and HR-87Q-DEP02), iron (eight locations), manganese (four locations), and thallium (HR-87Q-MW17 and HR-87Q-MW18). With the exception of the antimony results, the concentrations of these metals were within the range of background values established by SAIC (1998). However, the antimony results were flagged with a "J" data qualifier indicating that the concentrations (4.56 to 8.15 mg/kg) were estimated values.

Table 5-1

Surface and Depositional Soil Analytical Results
Range 29, Parcel 87Q-X
Fort McClellan, Calhoun County, Alabama

Sample Location					HR-87Q-DEP01					HR-87Q-DEP02					HR-87Q-DEP03					HR-87Q-DEP04				
Sample Number					HL0070					HL0071					HL0072					HL0075				
Sample Date					11-Jan-01					11-Jan-01					11-Jan-01					11-Jan-01				
Sample Depth (Feet)					0- 1					0- 1					0- 1					0- 1				
Parameter	Units	BKG[a]	SSSL[b]	ESV[b]	Result	Qual	>BKG	>SSSL	>ESV	Result	Qual	>BKG	>SSSL	>ESV	Result	Qual	>BKG	>SSSL	>ESV	Result	Qual	>BKG	>SSSL	>ESV
METALS																								
Aluminum	mg/kg	1.63E+04	7.80E+03	5.00E+01	1.50E+04			YES	YES	9.44E+03			YES	YES	9.44E+03			YES	YES	1.07E+04			YES	YES
Antimony	mg/kg	1.99E+00	3.11E+00	3.50E+00	8.15E+00	J	YES	YES	YES	ND					ND					ND				
Arsenic	mg/kg	1.37E+01	4.26E-01	1.00E+01	2.62E+01		YES	YES	YES	1.00E+01			YES	YES	5.27E+00			YES		5.45E+00			YES	
Barium	mg/kg	1.24E+02	5.47E+02	1.65E+02	5.19E+01					3.41E+01					2.14E+01					5.14E+01				
Beryllium	mg/kg	8.00E-01	9.60E+00	1.10E+00	6.63E-01	J				4.92E-01	J				1.90E-01	J				3.52E-01	J			
Calcium	mg/kg	1.72E+03	NA	NA	2.58E+02					3.04E+02					1.90E+02					4.11E+02				
Chromium	mg/kg	3.70E+01	2.32E+01	4.00E-01	3.98E+01	J	YES	YES	YES	4.03E+01	J	YES	YES	YES	2.94E+01	J		YES	YES	2.24E+01	J			YES
Cobalt	mg/kg	1.52E+01	4.68E+02	2.00E+01	1.05E+01					5.16E+00					1.28E+00	B				8.06E+00				
Copper	mg/kg	1.27E+01	3.13E+02	4.00E+01	1.88E+01	J	YES			9.62E+01	J	YES		YES	1.84E+01	J	YES			3.87E+00	J			
Iron	mg/kg	3.42E+04	2.34E+03	2.00E+02	5.61E+04		YES	YES	YES	4.89E+04		YES	YES	YES	2.23E+04			YES	YES	2.41E+04			YES	YES
Lead	mg/kg	4.01E+01	4.00E+02	5.00E+01	5.15E+01	J	YES		YES	3.73E+02	J	YES		YES	9.49E+01	J	YES		YES	1.85E+01	J			
Magnesium	mg/kg	1.03E+03	NA	4.40E+05	4.14E+02					2.60E+02					1.81E+02					2.45E+02				
Manganese	mg/kg	1.58E+03	3.63E+02	1.00E+02	3.07E+02	J			YES	3.54E+02	J			YES	1.25E+02	J			YES	7.41E+02	J		YES	YES
Mercury	mg/kg	8.00E-02	2.33E+00	1.00E-01	9.50E-02	J	YES			4.80E-02	J				6.50E-02	J				6.70E-02	J			
Nickel	mg/kg	1.03E+01	1.54E+02	3.00E+01	1.17E+01	J	YES			1.26E+01	J	YES			5.32E+00	J				4.44E+00	J			
Potassium	mg/kg	8.00E+02	NA	NA	3.56E+02	B				4.26E+02	B				ND					3.25E+02	B			
Selenium	mg/kg	4.80E-01	3.91E+01	8.10E-01	ND					ND					ND					ND				
Silver	mg/kg	3.60E-01	3.91E+01	2.00E+00	ND					ND					ND					ND				
Sodium	mg/kg	6.34E+02	NA	NA	2.74E+01	J				2.63E+01	J				2.43E+01	J				ND				
Thallium	mg/kg	3.43E+00	5.08E-01	1.00E+00	ND					ND					ND					1.27E+00	J		YES	YES
Vanadium	mg/kg	5.88E+01	5.31E+01	2.00E+00	4.82E+01				YES	2.98E+01				YES	3.63E+01				YES	3.07E+01				YES
Zinc	mg/kg	4.06E+01	2.34E+03	5.00E+01	7.08E+01	J	YES		YES	9.74E+01	J	YES		YES	1.47E+01	J				1.42E+01	J			
VOLATILE ORGANIC COMPOUNDS																								
2-Butanone	mg/kg	NA	4.66E+03	8.96E+01	NR					NR					NR					NR				
Acetone	mg/kg	NA	7.76E+02	2.50E+00	NR					NR					NR					NR				
Benzene	mg/kg	NA	2.17E+01	5.00E-02	NR					NR					NR					NR				
Dichlorodifluoromethane	mg/kg	NA	1.55E+03	1.00E-01	NR					NR					NR					NR				
Methylene chloride	mg/kg	NA	8.41E+01	2.00E+00	NR					NR					NR					NR				
Trichloroethene	mg/kg	NA	5.72E+01	1.00E-03	NR					NR					NR					NR				
HERBICIDES																								
2,4-D	mg/kg	NA	7.77E+01	1.00E-01	NR					NR					NR					NR				
MCPA	mg/kg	NA	3.88E+00	1.00E-01	NR					NR					NR					NR				
PERCHLORATE																								
Perchlorate	mg/kg	NA	7.04E+00	NA	ND					ND					ND					ND				
TOTAL ORGANIC CARBON																								
Total Organic Carbon	mg/kg	NA	NA	NA	1.83E+01					4.37E+01					2.11E+01					2.55E+01				

Table 5-1

Surface and Depositional Soil Analytical Results
Range 29, Parcel 87Q-X
Fort McClellan, Calhoun County, Alabama

Sample Location					HR-87Q-DEP05					HR-87Q-DEP06					HR-87Q-DEP07					HR-87Q-GP01				
Sample Number					HL0076					HL0077					HL0078					HL0043				
Sample Date					17-Jan-01					17-Jan-01					17-Jan-01					6-Dec-00				
Sample Depth (Feet)					0- 1					0- 1					0- 1					0- 1				
Parameter	Units	BKG[a]	SSSL[b]	ESV[b]	Result	Qual	>BKG	>SSSL	>ESV	Result	Qual	>BKG	>SSSL	>ESV	Result	Qual	>BKG	>SSSL	>ESV	Result	Qual	>BKG	>SSSL	>ESV
METALS																								
Aluminum	mg/kg	1.63E+04	7.80E+03	5.00E+01	9.31E+03			YES	YES	9.60E+03			YES	YES	1.10E+04			YES	YES	1.05E+04			YES	YES
Antimony	mg/kg	1.99E+00	3.11E+00	3.50E+00	ND					ND					ND					ND				
Arsenic	mg/kg	1.37E+01	4.26E-01	1.00E+01	8.42E+00			YES		8.12E+00			YES		6.40E+00			YES		5.37E+00			YES	
Barium	mg/kg	1.24E+02	5.47E+02	1.65E+02	1.16E+02					1.85E+02		YES		YES	5.67E+01					3.13E+01	J			
Beryllium	mg/kg	8.00E-01	9.60E+00	1.10E+00	1.43E+00		YES		YES	1.14E+00	J	YES		YES	6.72E-01	J				2.34E-01	J			
Calcium	mg/kg	1.72E+03	NA	NA	5.41E+02					9.38E+03		YES			1.14E+03					3.75E+02				
Chromium	mg/kg	3.70E+01	2.32E+01	4.00E-01	2.37E+01			YES	YES	2.37E+01			YES	YES	2.15E+01				YES	1.98E+01	J			YES
Cobalt	mg/kg	1.52E+01	4.68E+02	2.00E+01	2.04E+01		YES		YES	1.25E+01					2.63E+00					2.37E+00	J			
Copper	mg/kg	1.27E+01	3.13E+02	4.00E+01	3.55E+01		YES			2.07E+01		YES			3.53E+01		YES			1.77E+01	J	YES		
Iron	mg/kg	3.42E+04	2.34E+03	2.00E+02	4.83E+04		YES	YES	YES	4.02E+04		YES	YES	YES	4.10E+04		YES	YES	YES	2.00E+04			YES	YES
Lead	mg/kg	4.01E+01	4.00E+02	5.00E+01	3.19E+01					3.10E+01					2.00E+01					1.30E+02	J	YES		YES
Magnesium	mg/kg	1.03E+03	NA	4.40E+05	1.41E+03		YES			1.30E+03		YES			2.60E+02					2.93E+02				
Manganese	mg/kg	1.58E+03	3.63E+02	1.00E+02	1.10E+03			YES	YES	1.05E+03			YES	YES	3.53E+02				YES	2.27E+02				YES
Mercury	mg/kg	8.00E-02	2.33E+00	1.00E-01	ND					3.80E-02	J				ND					6.80E-02	J			
Nickel	mg/kg	1.03E+01	1.54E+02	3.00E+01	2.47E+01		YES			1.39E+01		YES			8.20E+00					4.31E+00	J			
Potassium	mg/kg	8.00E+02	NA	NA	8.70E+02	B	YES			8.35E+02	B	YES			8.51E+02	B	YES			2.63E+02	B			
Selenium	mg/kg	4.80E-01	3.91E+01	8.10E-01	ND					ND					ND					ND				
Silver	mg/kg	3.60E-01	3.91E+01	2.00E+00	ND					ND					ND					5.74E-01	B	YES		
Sodium	mg/kg	6.34E+02	NA	NA	ND					ND					ND					2.08E+01	J			
Thallium	mg/kg	3.43E+00	5.08E-01	1.00E+00	ND					ND					ND					2.16E+00	B		YES	YES
Vanadium	mg/kg	5.88E+01	5.31E+01	2.00E+00	3.56E+01				YES	2.31E+01				YES	4.24E+01				YES	3.25E+01				YES
Zinc	mg/kg	4.06E+01	2.34E+03	5.00E+01	7.73E+01		YES		YES	4.85E+01		YES			4.14E+01		YES			1.49E+01	J			
VOLATILE ORGANIC COMPOUNDS																								
2-Butanone	mg/kg	NA	4.66E+03	8.96E+01	NR					NR					NR					NR				
Acetone	mg/kg	NA	7.76E+02	2.50E+00	NR					NR					NR					NR				
Benzene	mg/kg	NA	2.17E+01	5.00E-02	NR					NR					NR					NR				
Dichlorodifluoromethane	mg/kg	NA	1.55E+03	1.00E-01	NR					NR					NR					NR				
Methylene chloride	mg/kg	NA	8.41E+01	2.00E+00	NR					NR					NR					NR				
Trichloroethene	mg/kg	NA	5.72E+01	1.00E-03	NR					NR					NR					NR				
HERBICIDES																								
2,4-D	mg/kg	NA	7.77E+01	1.00E-01	NR					NR					NR					NR				
MCPA	mg/kg	NA	3.88E+00	1.00E-01	NR					NR					NR					NR				
PERCHLORATE																								
Perchlorate	mg/kg	NA	7.04E+00	NA	ND					ND					ND					ND				
TOTAL ORGANIC CARBON																								
Total Organic Carbon	mg/kg	NA	NA	NA	NR					NR					NR					NR				

Table 5-1

Surface and Depositional Soil Analytical Results
Range 29, Parcel 87Q-X
Fort McClellan, Calhoun County, Alabama

Sample Location					HR-87Q-GP02					HR-87Q-GP03					HR-87Q-GP04					HR-87Q-GP05				
Sample Number					HL0045					HL0047					HL0049					HL0051				
Sample Date					4-Dec-00					4-Dec-00					4-Dec-00					4-Dec-00				
Sample Depth (Feet)					0- 1					0- 1					0- 1					0- 1				
Parameter	Units	BKG[a]	SSSL[b]	ESV[b]	Result	Qual	>BKG	>SSSL	>ESV	Result	Qual	>BKG	>SSSL	>ESV	Result	Qual	>BKG	>SSSL	>ESV	Result	Qual	>BKG	>SSSL	>ESV
METALS																								
Aluminum	mg/kg	1.63E+04	7.80E+03	5.00E+01	1.08E+04			YES	YES	1.93E+04		YES	YES	YES	1.18E+04			YES	YES	1.72E+04		YES	YES	YES
Antimony	mg/kg	1.99E+00	3.11E+00	3.50E+00	ND					4.56E+00	J	YES	YES	YES	ND					ND				
Arsenic	mg/kg	1.37E+01	4.26E-01	1.00E+01	3.97E+00	J		YES		1.07E+01	J		YES	YES	6.22E+00	J		YES		8.26E+00	J		YES	
Barium	mg/kg	1.24E+02	5.47E+02	1.65E+02	8.48E+01					5.80E+01					6.07E+01					1.07E+02				
Beryllium	mg/kg	8.00E-01	9.60E+00	1.10E+00	5.55E-01	J				8.06E-01	J	YES			4.76E-01	J				6.17E-01	J			
Calcium	mg/kg	1.72E+03	NA	NA	4.97E+02					3.51E+02					4.94E+02					6.97E+02				
Chromium	mg/kg	3.70E+01	2.32E+01	4.00E-01	2.58E+01	J		YES	YES	1.61E+01	J			YES	2.61E+01	J		YES	YES	2.43E+01	J		YES	YES
Cobalt	mg/kg	1.52E+01	4.68E+02	2.00E+01	9.38E+00					9.49E+00					9.08E+00					1.28E+01				
Copper	mg/kg	1.27E+01	3.13E+02	4.00E+01	6.23E+00					3.13E+01		YES			2.30E+01		YES			1.55E+01		YES		
Iron	mg/kg	3.42E+04	2.34E+03	2.00E+02	1.43E+04			YES	YES	3.85E+04		YES	YES	YES	2.25E+04			YES	YES	2.86E+04			YES	YES
Lead	mg/kg	4.01E+01	4.00E+02	5.00E+01	3.53E+01	J				1.43E+02	J	YES		YES	5.79E+01	J	YES		YES	5.55E+01	J	YES		YES
Magnesium	mg/kg	1.03E+03	NA	4.40E+05	3.12E+02					4.49E+02					3.84E+02					6.28E+02				
Manganese	mg/kg	1.58E+03	3.63E+02	1.00E+02	1.24E+03			YES	YES	2.27E+03		YES	YES	YES	5.91E+02			YES	YES	6.10E+02			YES	YES
Mercury	mg/kg	8.00E-02	2.33E+00	1.00E-01	3.90E-02	J				8.60E-02	J	YES			5.10E-02	J				6.40E-02	J			
Nickel	mg/kg	1.03E+01	1.54E+02	3.00E+01	6.27E+00					1.01E+01					5.64E+00					8.26E+00				
Potassium	mg/kg	8.00E+02	NA	NA	3.02E+02	J				4.55E+02	J				5.25E+02	J				7.04E+02				
Selenium	mg/kg	4.80E-01	3.91E+01	8.10E-01	ND					ND					ND					ND				
Silver	mg/kg	3.60E-01	3.91E+01	2.00E+00	ND					ND					7.84E-01	J	YES			6.55E-01	J	YES		
Sodium	mg/kg	6.34E+02	NA	NA	3.06E+01	J				2.89E+01	J				4.79E+01	J				4.11E+01	J			
Thallium	mg/kg	3.43E+00	5.08E-01	1.00E+00	1.05E+00	J		YES	YES	3.23E+00	J		YES	YES	1.21E+00	J		YES	YES	1.91E+00	J		YES	YES
Vanadium	mg/kg	5.88E+01	5.31E+01	2.00E+00	2.26E+01				YES	4.26E+01				YES	2.84E+01				YES	3.69E+01				YES
Zinc	mg/kg	4.06E+01	2.34E+03	5.00E+01	3.89E+01	J				2.55E+01	J				1.96E+01	J				3.52E+01	J			
VOLATILE ORGANIC COMPOUNDS																								
2-Butanone	mg/kg	NA	4.66E+03	8.96E+01	NR					NR					NR					NR				
Acetone	mg/kg	NA	7.76E+02	2.50E+00	NR					NR					NR					NR				
Benzene	mg/kg	NA	2.17E+01	5.00E-02	NR					NR					NR					NR				
Dichlorodifluoromethane	mg/kg	NA	1.55E+03	1.00E-01	NR					NR					NR					NR				
Methylene chloride	mg/kg	NA	8.41E+01	2.00E+00	NR					NR					NR					NR				
Trichloroethene	mg/kg	NA	5.72E+01	1.00E-03	NR					NR					NR					NR				
HERBICIDES																								
2,4-D	mg/kg	NA	7.77E+01	1.00E-01	NR					NR					NR					NR				
MCPA	mg/kg	NA	3.88E+00	1.00E-01	NR					NR					NR					NR				
PERCHLORATE																								
Perchlorate	mg/kg	NA	7.04E+00	NA	ND					ND					ND					ND				
TOTAL ORGANIC CARBON																								
Total Organic Carbon	mg/kg	NA	NA	NA	NR					NR					NR					NR				

Table 5-1

Surface and Depositional Soil Analytical Results
Range 29, Parcel 87Q-X
Fort McClellan, Calhoun County, Alabama

Sample Location					HR-87Q-GP06					HR-87Q-GP07					HR-87Q-GP08					HR-87Q-GP09				
Sample Number					HL0054					HL0056					HL0058					HL0060				
Sample Date					4-Dec-00					6-Dec-00					5-Dec-00					5-Dec-00				
Sample Depth (Feet)					0- 1					0- 1					0- 1					0- 1				
Parameter	Units	BKG[a]	SSSL[b]	ESV[b]	Result	Qual	>BKG	>SSSL	>ESV	Result	Qual	>BKG	>SSSL	>ESV	Result	Qual	>BKG	>SSSL	>ESV	Result	Qual	>BKG	>SSSL	>ESV
METALS																								
Aluminum	mg/kg	1.63E+04	7.80E+03	5.00E+01	1.03E+04			YES	YES	5.94E+03				YES	6.60E+03				YES	4.67E+03				YES
Antimony	mg/kg	1.99E+00	3.11E+00	3.50E+00	ND					ND					5.83E+00	J	YES	YES	YES	ND				
Arsenic	mg/kg	1.37E+01	4.26E-01	1.00E+01	6.93E+00	J		YES		1.71E+00			YES		5.45E+00			YES		1.79E+00			YES	
Barium	mg/kg	1.24E+02	5.47E+02	1.65E+02	8.16E+01					8.06E+01	J				1.50E+01					6.43E+01				
Beryllium	mg/kg	8.00E-01	9.60E+00	1.10E+00	5.94E-01	J				4.13E-01	J				1.10E-01	J				3.31E-01	J			
Calcium	mg/kg	1.72E+03	NA	NA	6.20E+02					7.47E+02					8.76E+01	J				2.71E+02				
Chromium	mg/kg	3.70E+01	2.32E+01	4.00E-01	3.03E+01	J		YES	YES	9.55E+00	J			YES	3.24E+01			YES	YES	9.90E+00	J			YES
Cobalt	mg/kg	1.52E+01	4.68E+02	2.00E+01	1.49E+01					8.32E+00	J				7.76E-01	J				9.27E+00				
Copper	mg/kg	1.27E+01	3.13E+02	4.00E+01	1.15E+01					3.04E+00	J				9.56E+00					3.08E+00				
Iron	mg/kg	3.42E+04	2.34E+03	2.00E+02	2.52E+04			YES	YES	5.82E+03			YES	YES	2.82E+04			YES	YES	4.77E+03			YES	YES
Lead	mg/kg	4.01E+01	4.00E+02	5.00E+01	4.52E+01	J	YES			2.28E+01	J				1.12E+01	J				2.87E+01	J			
Magnesium	mg/kg	1.03E+03	NA	4.40E+05	4.23E+02					2.30E+02					7.31E+01	J				1.32E+02				
Manganese	mg/kg	1.58E+03	3.63E+02	1.00E+02	1.00E+03			YES	YES	8.26E+02			YES	YES	3.12E+01					6.45E+02			YES	YES
Mercury	mg/kg	8.00E-02	2.33E+00	1.00E-01	3.30E-02	J				4.30E-02	J				6.50E-02	J				6.20E-02	J			
Nickel	mg/kg	1.03E+01	1.54E+02	3.00E+01	6.06E+00					3.06E+00	J				ND					3.07E+00				
Potassium	mg/kg	8.00E+02	NA	NA	5.81E+02	J				3.13E+02	B				2.06E+02	J				2.81E+02	J			
Selenium	mg/kg	4.80E-01	3.91E+01	8.10E-01	ND					ND					ND					ND				
Silver	mg/kg	3.60E-01	3.91E+01	2.00E+00	7.05E-01	J	YES			ND					ND					ND				
Sodium	mg/kg	6.34E+02	NA	NA	3.70E+01	J				2.63E+01	J				ND					ND				
Thallium	mg/kg	3.43E+00	5.08E-01	1.00E+00	1.75E+00	J		YES	YES	5.55E-01	B		YES		2.28E+00	J		YES	YES	ND				
Vanadium	mg/kg	5.88E+01	5.31E+01	2.00E+00	2.85E+01				YES	9.75E+00				YES	4.59E+01				YES	7.23E+00				YES
Zinc	mg/kg	4.06E+01	2.34E+03	5.00E+01	2.38E+01	J				1.46E+01	J				6.76E+00					1.38E+01				
VOLATILE ORGANIC COMPOUNDS																								
2-Butanone	mg/kg	NA	4.66E+03	8.96E+01	NR					NR					NR					NR				
Acetone	mg/kg	NA	7.76E+02	2.50E+00	NR					NR					NR					NR				
Benzene	mg/kg	NA	2.17E+01	5.00E-02	NR					NR					NR					NR				
Dichlorodifluoromethane	mg/kg	NA	1.55E+03	1.00E-01	NR					NR					NR					NR				
Methylene chloride	mg/kg	NA	8.41E+01	2.00E+00	NR					NR					NR					NR				
Trichloroethene	mg/kg	NA	5.72E+01	1.00E-03	NR					NR					NR					NR				
HERBICIDES																								
2,4-D	mg/kg	NA	7.77E+01	1.00E-01	NR					NR					NR					NR				
MCPA	mg/kg	NA	3.88E+00	1.00E-01	NR					NR					NR					NR				
PERCHLORATE																								
Perchlorate	mg/kg	NA	7.04E+00	NA	ND					ND					ND					ND				
TOTAL ORGANIC CARBON																								
Total Organic Carbon	mg/kg	NA	NA	NA	NR					NR					NR					NR				

Table 5-1

Surface and Depositional Soil Analytical Results
Range 29, Parcel 87Q-X
Fort McClellan, Calhoun County, Alabama

Sample Location					HR-87Q-GP10					HR-87Q-MW01					HR-87Q-MW02					HR-87Q-MW03				
Sample Number					HL0064					HL0001					HL0003					HL0007				
Sample Date					4-Dec-00					6-Dec-00					6-Dec-00					5-Dec-00				
Sample Depth (Feet)					0- 1					0- 1					0- 1					0- 1				
Parameter	Units	BKG[a]	SSSL[b]	ESV[b]	Result	Qual	>BKG	>SSSL	>ESV	Result	Qual	>BKG	>SSSL	>ESV	Result	Qual	>BKG	>SSSL	>ESV	Result	Qual	>BKG	>SSSL	>ESV
METALS																								
Aluminum	mg/kg	1.63E+04	7.80E+03	5.00E+01	6.86E+03				YES	1.69E+04		YES	YES	YES	1.03E+04			YES	YES	5.04E+03				YES
Antimony	mg/kg	1.99E+00	3.11E+00	3.50E+00	ND					5.37E+00	J	YES	YES	YES	ND					ND				
Arsenic	mg/kg	1.37E+01	4.26E-01	1.00E+01	2.35E+00	J		YES		6.98E+00			YES		4.99E+00			YES		2.22E+00			YES	
Barium	mg/kg	1.24E+02	5.47E+02	1.65E+02	5.75E+01					1.11E+02	J				4.68E+01	J				5.03E+01				
Beryllium	mg/kg	8.00E-01	9.60E+00	1.10E+00	3.18E-01	J				7.50E-01	J				3.58E-01	J				3.64E-01	J			
Calcium	mg/kg	1.72E+03	NA	NA	1.26E+02					7.79E+02					4.16E+02					4.47E+02				
Chromium	mg/kg	3.70E+01	2.32E+01	4.00E-01	8.56E+00	J			YES	3.06E+01	J		YES	YES	1.08E+01	J			YES	1.93E+01				YES
Cobalt	mg/kg	1.52E+01	4.68E+02	2.00E+01	3.12E+00					9.02E+00	J				3.87E+00	J				3.05E+00				
Copper	mg/kg	1.27E+01	3.13E+02	4.00E+01	6.07E+00					3.03E+01	J	YES			1.28E+01	J	YES			8.98E+00				
Iron	mg/kg	3.42E+04	2.34E+03	2.00E+02	7.62E+03			YES	YES	2.36E+04			YES	YES	1.65E+04			YES	YES	1.23E+04			YES	YES
Lead	mg/kg	4.01E+01	4.00E+02	5.00E+01	1.85E+01	J				4.93E+01	J	YES			5.58E+01	J	YES		YES	1.67E+01	J			
Magnesium	mg/kg	1.03E+03	NA	4.40E+05	2.51E+02					4.89E+02					3.65E+02					1.44E+02				
Manganese	mg/kg	1.58E+03	3.63E+02	1.00E+02	4.45E+02			YES	YES	8.82E+02			YES	YES	4.66E+02			YES	YES	3.73E+02			YES	YES
Mercury	mg/kg	8.00E-02	2.33E+00	1.00E-01	4.20E-02	J				2.50E-02	J				4.50E-02	J				3.10E-02	J			
Nickel	mg/kg	1.03E+01	1.54E+02	3.00E+01	2.79E+00					8.12E+00	J				5.35E+00	J				2.96E+00				
Potassium	mg/kg	8.00E+02	NA	NA	2.24E+02	J				4.76E+02	J				3.81E+02	J				4.00E+02	J			
Selenium	mg/kg	4.80E-01	3.91E+01	8.10E-01	ND					ND					ND					4.92E-01	B	YES		
Silver	mg/kg	3.60E-01	3.91E+01	2.00E+00	6.79E-01	J	YES			6.15E-01	B	YES			ND					ND				
Sodium	mg/kg	6.34E+02	NA	NA	4.15E+01	J				3.34E+01	J				ND					ND				
Thallium	mg/kg	3.43E+00	5.08E-01	1.00E+00	ND					2.05E+00	B		YES	YES	9.10E-01	B		YES		8.03E-01	B		YES	
Vanadium	mg/kg	5.88E+01	5.31E+01	2.00E+00	1.14E+01				YES	3.95E+01				YES	2.16E+01				YES	1.45E+01				YES
Zinc	mg/kg	4.06E+01	2.34E+03	5.00E+01	2.07E+01	J				7.73E+01	J	YES		YES	1.65E+01	J				1.02E+01				
VOLATILE ORGANIC COMPOUNDS																								
2-Butanone	mg/kg	NA	4.66E+03	8.96E+01	NR					NR					NR					NR				
Acetone	mg/kg	NA	7.76E+02	2.50E+00	NR					NR					NR					NR				
Benzene	mg/kg	NA	2.17E+01	5.00E-02	NR					NR					NR					NR				
Dichlorodifluoromethane	mg/kg	NA	1.55E+03	1.00E-01	NR					NR					NR					NR				
Methylene chloride	mg/kg	NA	8.41E+01	2.00E+00	NR					NR					NR					NR				
Trichloroethene	mg/kg	NA	5.72E+01	1.00E-03	NR					NR					NR					NR				
HERBICIDES																								
2,4-D	mg/kg	NA	7.77E+01	1.00E-01	NR					NR					NR					NR				
MCPA	mg/kg	NA	3.88E+00	1.00E-01	NR					NR					NR					NR				
PERCHLORATE																								
Perchlorate	mg/kg	NA	7.04E+00	NA	ND					ND					ND					1.03E-02	J			
TOTAL ORGANIC CARBON																								
Total Organic Carbon	mg/kg	NA	NA	NA	NR					NR					NR					NR				

Table 5-1

Surface and Depositional Soil Analytical Results
Range 29, Parcel 87Q-X
Fort McClellan, Calhoun County, Alabama

Sample Location					HR-87Q-MW04					HR-87Q-MW05					HR-87Q-MW09					HR-87Q-MW10				
Sample Number					HL0009					HL0011					HL0020					HL0026				
Sample Date					5-Dec-00					9-Apr-01					5-Dec-00					5-Dec-00				
Sample Depth (Feet)					0- 1					0- 1					0- 1					0- 1				
Parameter	Units	BKG[a]	SSSL[b]	ESV[b]	Result	Qual	>BKG	>SSSL	>ESV	Result	Qual	>BKG	>SSSL	>ESV	Result	Qual	>BKG	>SSSL	>ESV	Result	Qual	>BKG	>SSSL	>ESV
METALS																								
Aluminum	mg/kg	1.63E+04	7.80E+03	5.00E+01	6.26E+03				YES	1.85E+04		YES	YES	YES	6.96E+03				YES	1.18E+04			YES	YES
Antimony	mg/kg	1.99E+00	3.11E+00	3.50E+00	6.15E+00	J	YES	YES	YES	5.85E+00	J	YES	YES	YES	ND					ND				
Arsenic	mg/kg	1.37E+01	4.26E-01	1.00E+01	3.63E+00			YES		2.89E+01		YES	YES	YES	2.16E+00			YES		4.57E+00			YES	
Barium	mg/kg	1.24E+02	5.47E+02	1.65E+02	3.35E+01					6.22E+01					8.05E+01					2.87E+02	J	YES		YES
Beryllium	mg/kg	8.00E-01	9.60E+00	1.10E+00	2.36E-01	J				6.05E-01	J				4.35E-01	J				6.82E-01	J			
Calcium	mg/kg	1.72E+03	NA	NA	6.33E+02					8.08E+03		YES			4.98E+02					5.32E+02				
Chromium	mg/kg	3.70E+01	2.32E+01	4.00E-01	2.02E+01				YES	3.01E+01			YES	YES	9.46E+00				YES	2.22E+01				YES
Cobalt	mg/kg	1.52E+01	4.68E+02	2.00E+01	2.63E+00					4.89E+00					6.34E+00					8.89E+00				
Copper	mg/kg	1.27E+01	3.13E+02	4.00E+01	5.62E+00					2.44E+01		YES			9.59E+00					8.99E+00	J			
Iron	mg/kg	3.42E+04	2.34E+03	2.00E+02	1.66E+04			YES	YES	5.38E+04		YES	YES	YES	6.82E+03			YES	YES	2.61E+04	J		YES	YES
Lead	mg/kg	4.01E+01	4.00E+02	5.00E+01	1.78E+01	J				2.34E+01					3.24E+01	J				6.70E+01	J	YES		YES
Magnesium	mg/kg	1.03E+03	NA	4.40E+05	1.33E+02					8.21E+02					2.28E+02					2.39E+02				
Manganese	mg/kg	1.58E+03	3.63E+02	1.00E+02	1.45E+02				YES	2.24E+02				YES	8.55E+02			YES	YES	1.47E+03	J		YES	YES
Mercury	mg/kg	8.00E-02	2.33E+00	1.00E-01	4.70E-02	J				7.90E-02	J				6.30E-02	J				6.40E-02	J			
Nickel	mg/kg	1.03E+01	1.54E+02	3.00E+01	2.43E+00					1.64E+01		YES			3.52E+00					6.34E+00	J			
Potassium	mg/kg	8.00E+02	NA	NA	3.10E+02	J				1.14E+03		YES			2.57E+02	J				3.70E+02	J			
Selenium	mg/kg	4.80E-01	3.91E+01	8.10E-01	ND					ND					6.56E-01	B	YES			ND				
Silver	mg/kg	3.60E-01	3.91E+01	2.00E+00	ND					ND					ND					ND				
Sodium	mg/kg	6.34E+02	NA	NA	ND					ND					ND					2.72E+01	J			
Thallium	mg/kg	3.43E+00	5.08E-01	1.00E+00	1.56E+00	B		YES	YES	1.10E+00	J		YES	YES	ND					2.30E+00	J		YES	YES
Vanadium	mg/kg	5.88E+01	5.31E+01	2.00E+00	2.26E+01				YES	4.84E+01				YES	9.50E+00				YES	2.19E+01				YES
Zinc	mg/kg	4.06E+01	2.34E+03	5.00E+01	7.05E+00					8.44E+01		YES		YES	1.67E+01					2.52E+01	J			
VOLATILE ORGANIC COMPOUNDS																								
2-Butanone	mg/kg	NA	4.66E+03	8.96E+01	NR					NR					NR					NR				
Acetone	mg/kg	NA	7.76E+02	2.50E+00	NR					NR					NR					NR				
Benzene	mg/kg	NA	2.17E+01	5.00E-02	NR					NR					NR					NR				
Dichlorodifluoromethane	mg/kg	NA	1.55E+03	1.00E-01	NR					NR					NR					NR				
Methylene chloride	mg/kg	NA	8.41E+01	2.00E+00	NR					NR					NR					NR				
Trichloroethene	mg/kg	NA	5.72E+01	1.00E-03	NR					NR					NR					NR				
HERBICIDES																								
2,4-D	mg/kg	NA	7.77E+01	1.00E-01	NR					NR					NR					NR				
MCPA	mg/kg	NA	3.88E+00	1.00E-01	NR					NR					NR					NR				
PERCHLORATE																								
Perchlorate	mg/kg	NA	7.04E+00	NA	ND					ND					ND					ND				
TOTAL ORGANIC CARBON																								
Total Organic Carbon	mg/kg	NA	NA	NA	NR					NR					NR					NR				

Table 5-1

Surface and Depositional Soil Analytical Results
Range 29, Parcel 87Q-X
Fort McClellan, Calhoun County, Alabama

Sample Location					HR-87Q-MW11					HR-87Q-MW12					HR-87Q-MW13					HR-87Q-MW14				
Sample Number					HL0024					HL0022					HL0030					HL0032				
Sample Date					5-Dec-00					7-Dec-00					5-Dec-00					6-Dec-00				
Sample Depth (Feet)					0- 1					0- 1					0- 1					0- 1				
Parameter	Units	BKG[a]	SSSL[b]	ESV[b]	Result	Qual	>BKG	>SSSL	>ESV	Result	Qual	>BKG	>SSSL	>ESV	Result	Qual	>BKG	>SSSL	>ESV	Result	Qual	>BKG	>SSSL	>ESV
METALS																								
Aluminum	mg/kg	1.63E+04	7.80E+03	5.00E+01	4.92E+03				YES	6.79E+03				YES	7.53E+03				YES	1.17E+04			YES	YES
Antimony	mg/kg	1.99E+00	3.11E+00	3.50E+00	ND					ND					ND					ND				
Arsenic	mg/kg	1.37E+01	4.26E-01	1.00E+01	4.10E+00			YES		6.39E+00			YES		3.29E+00			YES		6.02E+00			YES	
Barium	mg/kg	1.24E+02	5.47E+02	1.65E+02	4.10E+01					1.21E+02					1.61E+02		YES			1.52E+02	J	YES		
Beryllium	mg/kg	8.00E-01	9.60E+00	1.10E+00	3.38E-01	J				6.33E-01	J				9.26E-01	J	YES			7.13E-01	J			
Calcium	mg/kg	1.72E+03	NA	NA	1.03E+02	J				1.01E+05		YES			1.17E+03					2.06E+03		YES		
Chromium	mg/kg	3.70E+01	2.32E+01	4.00E-01	1.26E+01				YES	2.85E+01			YES	YES	7.43E+00				YES	1.63E+01	J			YES
Cobalt	mg/kg	1.52E+01	4.68E+02	2.00E+01	2.36E+00					4.83E+00					1.44E+01					1.68E+01	J	YES		
Copper	mg/kg	1.27E+01	3.13E+02	4.00E+01	2.77E+00					1.23E+01					1.38E+01		YES			8.47E+00	J			
Iron	mg/kg	3.42E+04	2.34E+03	2.00E+02	1.58E+04			YES	YES	1.94E+04			YES	YES	9.97E+03			YES	YES	1.30E+04			YES	YES
Lead	mg/kg	4.01E+01	4.00E+02	5.00E+01	1.14E+01	J				2.89E+01					4.11E+01	J	YES			3.24E+01	J			
Magnesium	mg/kg	1.03E+03	NA	4.40E+05	1.16E+02					3.85E+03		YES			3.63E+02					4.97E+02				
Manganese	mg/kg	1.58E+03	3.63E+02	1.00E+02	9.56E+01					3.98E+02			YES	YES	1.37E+03			YES	YES	9.40E+02			YES	YES
Mercury	mg/kg	8.00E-02	2.33E+00	1.00E-01	2.90E-02	J				3.00E-02	J				6.20E-02	J				ND				
Nickel	mg/kg	1.03E+01	1.54E+02	3.00E+01	3.13E+00					7.31E+00					4.93E+00					7.29E+00	J			
Potassium	mg/kg	8.00E+02	NA	NA	1.66E+02	J				5.52E+02	B				4.35E+02	J				3.98E+02	B			
Selenium	mg/kg	4.80E-01	3.91E+01	8.10E-01	6.22E-01	B	YES			ND					ND					ND				
Silver	mg/kg	3.60E-01	3.91E+01	2.00E+00	ND					ND					ND					4.27E-01	B	YES		
Sodium	mg/kg	6.34E+02	NA	NA	ND					ND					ND					2.73E+01	J			
Thallium	mg/kg	3.43E+00	5.08E-01	1.00E+00	9.01E-01	J		YES		1.94E+00	B		YES	YES	1.06E+00	J		YES	YES	1.78E+00	B		YES	YES
Vanadium	mg/kg	5.88E+01	5.31E+01	2.00E+00	1.20E+01				YES	1.48E+01				YES	8.19E+00				YES	1.98E+01				YES
Zinc	mg/kg	4.06E+01	2.34E+03	5.00E+01	7.77E+00					2.83E+01					2.05E+01					4.95E+01	J	YES		
VOLATILE ORGANIC COMPOUNDS																								
2-Butanone	mg/kg	NA	4.66E+03	8.96E+01	NR					3.20E-03	J				NR					NR				
Acetone	mg/kg	NA	7.76E+02	2.50E+00	NR					4.40E-02	J				NR					NR				
Benzene	mg/kg	NA	2.17E+01	5.00E-02	NR					ND					NR					NR				
Dichlorodifluoromethane	mg/kg	NA	1.55E+03	1.00E-01	NR					ND					NR					NR				
Methylene chloride	mg/kg	NA	8.41E+01	2.00E+00	NR					1.00E-03	B				NR					NR				
Trichloroethene	mg/kg	NA	5.72E+01	1.00E-03	NR					ND					NR					NR				
HERBICIDES																								
2,4-D	mg/kg	NA	7.77E+01	1.00E-01	NR					3.20E-03	J				NR					NR				
MCPA	mg/kg	NA	3.88E+00	1.00E-01	NR					9.90E-01	J			YES	NR					NR				
PERCHLORATE																								
Perchlorate	mg/kg	NA	7.04E+00	NA	ND					ND					ND					ND				
TOTAL ORGANIC CARBON																								
Total Organic Carbon	mg/kg	NA	NA	NA	NR					NR					NR					NR				

Table 5-1

Surface and Depositional Soil Analytical Results
Range 29, Parcel 87Q-X
Fort McClellan, Calhoun County, Alabama

Sample Location					HR-87Q-MW15					HR-87Q-MW16					HR-87Q-MW17				
Sample Number					HL0034					HL0036					HL0038				
Sample Date					6-Dec-00					6-Dec-00					7-Dec-00				
Sample Depth (Feet)					0- 1					0- 1					0- 1				
Parameter	Units	BKG[a]	SSSL[b]	ESV[b]	Result	Qual	>BKG	>SSSL	>ESV	Result	Qual	>BKG	>SSSL	>ESV	Result	Qual	>BKG	>SSSL	>ESV
METALS																			
Aluminum	mg/kg	1.63E+04	7.80E+03	5.00E+01	9.26E+03			YES	YES	9.35E+03			YES	YES	9.53E+03			YES	YES
Antimony	mg/kg	1.99E+00	3.11E+00	3.50E+00	5.64E+00	J	YES	YES	YES	ND					5.86E+00	J	YES	YES	YES
Arsenic	mg/kg	1.37E+01	4.26E-01	1.00E+01	6.05E+00			YES		3.17E+00			YES		2.36E+01		YES	YES	YES
Barium	mg/kg	1.24E+02	5.47E+02	1.65E+02	2.58E+02	J	YES		YES	7.45E+01	J				1.93E+02		YES		YES
Beryllium	mg/kg	8.00E-01	9.60E+00	1.10E+00	1.73E+00	J	YES		YES	5.16E-01	J				1.61E+00		YES		YES
Calcium	mg/kg	1.72E+03	NA	NA	1.13E+03					2.28E+02					7.34E+02				
Chromium	mg/kg	3.70E+01	2.32E+01	4.00E-01	1.49E+01	J			YES	8.84E+00	J			YES	1.48E+01				YES
Cobalt	mg/kg	1.52E+01	4.68E+02	2.00E+01	1.72E+01	J	YES			4.52E+00	J				1.87E+01		YES		
Copper	mg/kg	1.27E+01	3.13E+02	4.00E+01	2.57E+01	J	YES			5.90E+00	J				8.39E+00				
Iron	mg/kg	3.42E+04	2.34E+03	2.00E+02	2.31E+04			YES	YES	8.15E+03			YES	YES	2.68E+04			YES	YES
Lead	mg/kg	4.01E+01	4.00E+02	5.00E+01	3.66E+01	J				2.85E+01	J				4.14E+01		YES		
Magnesium	mg/kg	1.03E+03	NA	4.40E+05	5.03E+02					3.71E+02					4.75E+02				
Manganese	mg/kg	1.58E+03	3.63E+02	1.00E+02	2.16E+03		YES	YES	YES	3.42E+02				YES	2.67E+03		YES	YES	YES
Mercury	mg/kg	8.00E-02	2.33E+00	1.00E-01	2.70E-02	J				3.70E-02	J				4.70E-02	J			
Nickel	mg/kg	1.03E+01	1.54E+02	3.00E+01	9.87E+00	J				4.76E+00	J				1.21E+01		YES		
Potassium	mg/kg	8.00E+02	NA	NA	6.22E+02	B				2.44E+02	B				5.97E+02	B			
Selenium	mg/kg	4.80E-01	3.91E+01	8.10E-01	ND					5.10E-01	J	YES			ND				
Silver	mg/kg	3.60E-01	3.91E+01	2.00E+00	4.90E-01	B	YES			ND					ND				
Sodium	mg/kg	6.34E+02	NA	NA	2.68E+01	J				2.82E+01	J				ND				
Thallium	mg/kg	3.43E+00	5.08E-01	1.00E+00	2.99E+00			YES	YES	9.00E-01	B		YES		3.74E+00	B	YES	YES	YES
Vanadium	mg/kg	5.88E+01	5.31E+01	2.00E+00	3.04E+01				YES	1.39E+01				YES	1.64E+01				YES
Zinc	mg/kg	4.06E+01	2.34E+03	5.00E+01	4.04E+01	J				2.79E+01	J				7.02E+01		YES		YES
VOLATILE ORGANIC COMPOUNDS																			
2-Butanone	mg/kg	NA	4.66E+03	8.96E+01	NR					NR					NR				
Acetone	mg/kg	NA	7.76E+02	2.50E+00	NR					NR					NR				
Benzene	mg/kg	NA	2.17E+01	5.00E-02	NR					NR					NR				
Dichlorodifluoromethane	mg/kg	NA	1.55E+03	1.00E-01	NR					NR					NR				
Methylene chloride	mg/kg	NA	8.41E+01	2.00E+00	NR					NR					NR				
Trichloroethene	mg/kg	NA	5.72E+01	1.00E-03	NR					NR					NR				
HERBICIDES																			
2,4-D	mg/kg	NA	7.77E+01	1.00E-01	NR					NR					NR				
MCPA	mg/kg	NA	3.88E+00	1.00E-01	NR					NR					NR				
PERCHLORATE																			
Perchlorate	mg/kg	NA	7.04E+00	NA	ND					ND					ND				
TOTAL ORGANIC CARBON																			
Total Organic Carbon	mg/kg	NA	NA	NA	NR					NR					NR				

Table 5-1

Surface and Depositional Soil Analytical Results
Range 29, Parcel 87Q-X
Fort McClellan, Calhoun County, Alabama

Sample Location					HR-87Q-MW18					HR-87Q-MW19				
Sample Number					HL0041					HL0066				
Sample Date					7-Dec-00					6-Dec-00				
Sample Depth (Feet)					0- 1					0- 1				
Parameter	Units	BKG[a]	SSSL[b]	ESV[b]	Result	Qual	>BKG	>SSSL	>ESV	Result	Qual	>BKG	>SSSL	>ESV
METALS														
Aluminum	mg/kg	1.63E+04	7.80E+03	5.00E+01	1.70E+04		YES	YES	YES	7.72E+03				YES
Antimony	mg/kg	1.99E+00	3.11E+00	3.50E+00	5.09E+00	J	YES	YES	YES	ND				
Arsenic	mg/kg	1.37E+01	4.26E-01	1.00E+01	1.96E+01		YES	YES	YES	3.41E+00			YES	
Barium	mg/kg	1.24E+02	5.47E+02	1.65E+02	3.87E+02		YES		YES	4.30E+01	J			
Beryllium	mg/kg	8.00E-01	9.60E+00	1.10E+00	4.10E+00		YES		YES	3.70E-01	J			
Calcium	mg/kg	1.72E+03	NA	NA	2.58E+03		YES			3.50E+02				
Chromium	mg/kg	3.70E+01	2.32E+01	4.00E-01	1.79E+01				YES	1.59E+01	J			YES
Cobalt	mg/kg	1.52E+01	4.68E+02	2.00E+01	1.93E+01		YES			8.10E+00	J			
Copper	mg/kg	1.27E+01	3.13E+02	4.00E+01	2.82E+01		YES			3.87E+00	J			
Iron	mg/kg	3.42E+04	2.34E+03	2.00E+02	3.95E+04		YES	YES	YES	1.29E+04			YES	YES
Lead	mg/kg	4.01E+01	4.00E+02	5.00E+01	5.70E+01		YES		YES	1.38E+01	J			
Magnesium	mg/kg	1.03E+03	NA	4.40E+05	1.61E+03		YES			2.79E+02				
Manganese	mg/kg	1.58E+03	3.63E+02	1.00E+02	4.33E+03		YES	YES	YES	8.49E+02			YES	YES
Mercury	mg/kg	8.00E-02	2.33E+00	1.00E-01	7.30E-02	J				3.10E-02	J			
Nickel	mg/kg	1.03E+01	1.54E+02	3.00E+01	2.05E+01		YES			5.70E+00	J			
Potassium	mg/kg	8.00E+02	NA	NA	9.67E+02		YES			3.21E+02	B			
Selenium	mg/kg	4.80E-01	3.91E+01	8.10E-01	ND					ND				
Silver	mg/kg	3.60E-01	3.91E+01	2.00E+00	ND					ND				
Sodium	mg/kg	6.34E+02	NA	NA	ND					ND				
Thallium	mg/kg	3.43E+00	5.08E-01	1.00E+00	7.99E+00	B	YES	YES	YES	1.50E+00	B		YES	YES
Vanadium	mg/kg	5.88E+01	5.31E+01	2.00E+00	2.69E+01				YES	1.67E+01				YES
Zinc	mg/kg	4.06E+01	2.34E+03	5.00E+01	1.08E+02		YES		YES	1.24E+01	J			
VOLATILE ORGANIC COMPOUNDS														
2-Butanone	mg/kg	NA	4.66E+03	8.96E+01	NR					2.00E-02				
Acetone	mg/kg	NA	7.76E+02	2.50E+00	NR					4.50E-01	J			
Benzene	mg/kg	NA	2.17E+01	5.00E-02	NR					3.10E-04	J			
Dichlorodifluoromethane	mg/kg	NA	1.55E+03	1.00E-01	NR					2.80E-02	B			
Methylene chloride	mg/kg	NA	8.41E+01	2.00E+00	NR					1.20E-03	B			
Trichloroethene	mg/kg	NA	5.72E+01	1.00E-03	NR					2.90E-03	J			YES
HERBICIDES														
2,4-D	mg/kg	NA	7.77E+01	1.00E-01	NR					NR				
MCPA	mg/kg	NA	3.88E+00	1.00E-01	NR					NR				
PERCHLORATE														
Perchlorate	mg/kg	NA	7.04E+00	NA	ND					ND				
TOTAL ORGANIC CARBON														
Total Organic Carbon	mg/kg	NA	NA	NA	NR					NR				

Table 5-1

Surface and Depositional Soil Analytical Results
Range 29, Parcel 87Q-X
Fort McClellan, Calhoun County, Alabama

Analyses performed using U.S. Environmental Protection Agency (EPA) SW-846 analytical methods.

[a] Bkg - Background. Concentration listed is two times (2x) the arithmetic mean of background metals concentration given in Science Applications International Corporation (1998), *Final Background Metals Survey Report, Fort McClellan, Alabama,* July.

[b] Residential human health site-specific screening level (SSSL) and ecological screening value (ESV) as given in IT Corporation (2000), *Final Human Health and Ecological Screening Values and PAH Background Summary Report, Fort McClellan, Calhoun County, Alabama,* July.

B - Analyte detected in laboratory or field blank at concentration greater than the reporting limit (and greater than zero).

J - Compound was positively identified; reported value is the estimated concentration.

mg/kg - Milligrams per kilogram.

NA - Not available.

ND - Not detected.

NR - Not requested.

Qual - Data validation qualifier.

Table 5-2

Subsurface Soil Analytical Results
Range 29, Parcel 87Q-X
Fort McClellan, Calhoun County, Alabama

Sample Location				HR-87Q-GP01				HR-87Q-GP02				HR-87Q-GP03				HR-87Q-GP04			
Sample Number				HL0044				HL0046				HL0048				HL0050			
Sample Date				6-Dec-00				4-Dec-00				4-Dec-00				4-Dec-00			
Sample Depth (Feet)				9 - 10				9 - 11				7 - 9				10 - 12			
Parameter	Units	BKG[a]	SSSL[b]	Result	Qual	>BKG	>SSSL	Result	Qual	>BKG	>SSSL	Result	Qual	>BKG	>SSSL	Result	Qual	>BKG	>SSSL
METALS																			
Aluminum	mg/kg	1.36E+04	7.80E+03	9.97E+03			YES	1.21E+04			YES	1.05E+04			YES	1.34E+04			YES
Antimony	mg/kg	1.31E+00	3.11E+00	5.39E+00	J	YES	YES	ND				ND				ND			
Arsenic	mg/kg	1.83E+01	4.26E-01	9.49E+00			YES	1.01E+01	J		YES	1.11E+01	J		YES	2.62E+01	J	YES	YES
Barium	mg/kg	2.34E+02	5.47E+02	1.02E+02	J			1.47E+02				2.72E+01				5.11E+01			
Beryllium	mg/kg	8.60E-01	9.60E+00	1.22E+00	J	YES		4.06E-01	J			3.99E-01	J			4.15E-01	J		
Calcium	mg/kg	6.37E+02	NA	1.61E+03		YES		6.48E+01	B			2.59E+02				1.17E+02	J		
Chromium	mg/kg	3.83E+01	2.32E+01	1.38E+01	J			2.68E+01	J		YES	2.84E+01	J		YES	4.00E+01	J	YES	YES
Cobalt	mg/kg	1.75E+01	4.68E+02	1.87E+01	J	YES		2.04E+01		YES		2.62E+00				4.00E+00			
Copper	mg/kg	1.94E+01	3.13E+02	4.04E+01	J	YES		1.49E+01				2.01E+01		YES		2.92E+01		YES	
Iron	mg/kg	4.48E+04	2.34E+03	4.74E+04		YES	YES	4.82E+04		YES	YES	4.02E+04			YES	5.19E+04		YES	YES
Lead	mg/kg	3.85E+01	4.00E+02	1.02E+02	J	YES		4.81E+01	J	YES		2.59E+01	J			1.58E+01	J		
Magnesium	mg/kg	7.66E+02	NA	6.49E+02				1.47E+02				2.25E+02				4.09E+02			
Manganese	mg/kg	1.36E+03	3.63E+02	4.76E+02			YES	1.80E+03		YES	YES	9.87E+01				9.08E+01			
Mercury	mg/kg	7.00E-02	2.33E+00	ND				7.20E-02	J	YES		8.40E-02	J	YES		1.19E-01	J	YES	
Nickel	mg/kg	1.29E+01	1.54E+02	2.40E+01	J	YES		4.56E+00				5.89E+00				9.48E+00			
Potassium	mg/kg	7.11E+02	NA	3.31E+02	B			2.99E+02	J			5.45E+02	J			5.71E+02	J		
Selenium	mg/kg	4.70E-01	3.91E+01	ND				ND				ND				ND			
Silver	mg/kg	2.40E-01	3.91E+01	ND				1.54E+00	J	YES		1.01E+00	J	YES		5.42E-01	J	YES	
Sodium	mg/kg	7.02E+02	NA	3.66E+01	J			3.50E+01	J			3.06E+01	J			5.34E+01	J		
Thallium	mg/kg	1.40E+00	5.08E-01	4.85E+00		YES	YES	3.79E+00	J	YES	YES	2.61E+00	J	YES	YES	3.92E+00	J	YES	YES
Vanadium	mg/kg	6.49E+01	5.31E+01	2.33E+01				4.56E+01				3.69E+01				4.92E+01			
Zinc	mg/kg	3.49E+01	2.34E+03	6.04E+01	J	YES		2.52E+01	J			3.40E+01	J			4.62E+01	J	YES	
VOLATILE ORGANIC COMPOUNDS																			
2-Butanone	mg/kg	NA	4.66E+03	NR				NR				NR				NR			
Acetone	mg/kg	NA	7.76E+02	NR				NR				NR				NR			
Carbon disulfide	mg/kg	NA	7.77E+02	NR				NR				NR				NR			
Dichlorodifluoromethane	mg/kg	NA	1.55E+03	NR				NR				NR				NR			
Methylene chloride	mg/kg	NA	8.41E+01	NR				NR				NR				NR			

Table 5-2

Subsurface Soil Analytical Results
Range 29, Parcel 87Q-X
Fort McClellan, Calhoun County, Alabama

Sample Location				HR-87Q-GP05				HR-87Q-GP06				HR-87Q-GP07				HR-87Q-GP08			
Sample Number				HL0053				HL0055				HL0057				HL0059			
Sample Date				4-Dec-00				4-Dec-00				6-Dec-00				5-Dec-00			
Sample Depth (Feet)				9 - 11				10 - 12				5 - 6				5 - 6			
Parameter	Units	BKG[a]	SSSL[b]	Result	Qual	>BKG	>SSSL	Result	Qual	>BKG	>SSSL	Result	Qual	>BKG	>SSSL	Result	Qual	>BKG	>SSSL
METALS																			
Aluminum	mg/kg	1.36E+04	7.80E+03	1.67E+04		YES	YES	1.98E+04		YES	YES	7.64E+03				8.18E+03			YES
Antimony	mg/kg	1.31E+00	3.11E+00	ND				ND				ND				ND			
Arsenic	mg/kg	1.83E+01	4.26E-01	1.34E+01	J		YES	5.31E+01	J	YES	YES	3.81E+00			YES	3.49E+00			YES
Barium	mg/kg	2.34E+02	5.47E+02	4.25E+01				1.04E+02				3.94E+01	J			1.73E+01			
Beryllium	mg/kg	8.60E-01	9.60E+00	8.28E-01	J			9.73E-01	J	YES		1.79E-01	J			1.03E-01	B		
Calcium	mg/kg	6.37E+02	NA	3.67E+02				3.29E+02				6.59E+01	J			3.38E+01	J		
Chromium	mg/kg	3.83E+01	2.32E+01	2.84E+01	J		YES	3.45E+01	J		YES	3.88E+01	J	YES	YES	3.58E+01			YES
Cobalt	mg/kg	1.75E+01	4.68E+02	2.10E+00	J			7.25E+00				5.29E+00	J			6.05E-01	J		
Copper	mg/kg	1.94E+01	3.13E+02	2.99E+01		YES		3.49E+01		YES		7.93E+00	J			9.94E+00			
Iron	mg/kg	4.48E+04	2.34E+03	8.00E+04		YES	YES	5.62E+04		YES	YES	2.12E+04			YES	3.04E+04			YES
Lead	mg/kg	3.85E+01	4.00E+02	2.21E+01	J			2.05E+01	J			1.37E+01	J			8.05E+00	J		
Magnesium	mg/kg	7.66E+02	NA	3.35E+02				5.05E+02				1.41E+02				6.67E+01	J		
Manganese	mg/kg	1.36E+03	3.63E+02	4.78E+01				2.14E+02				2.38E+02				2.25E+01			
Mercury	mg/kg	7.00E-02	2.33E+00	6.80E-02	J			1.88E-01		YES		2.80E-02	J			8.10E-02	J	YES	
Nickel	mg/kg	1.29E+01	1.54E+02	9.24E+00				1.94E+01		YES		5.48E+00	J			1.21E+00	J		
Potassium	mg/kg	7.11E+02	NA	4.97E+02	J			6.67E+02				1.95E+02	B			2.90E+02	J		
Selenium	mg/kg	4.70E-01	3.91E+01	ND				ND				ND				ND			
Silver	mg/kg	2.40E-01	3.91E+01	ND				ND				ND				ND			
Sodium	mg/kg	7.02E+02	NA	5.98E+01	J			4.40E+01	J			2.02E+01	J			ND			
Thallium	mg/kg	1.40E+00	5.08E-01	5.49E+00	J	YES	YES	3.89E+00	J	YES	YES	1.74E+00	B	YES	YES	1.98E+00	J	YES	YES
Vanadium	mg/kg	6.49E+01	5.31E+01	4.04E+01				6.87E+01		YES	YES	2.64E+01				4.12E+01			
Zinc	mg/kg	3.49E+01	2.34E+03	3.52E+01	J	YES		6.62E+01	J	YES		1.29E+01	J			6.68E+00			
VOLATILE ORGANIC COMPOUNDS																			
2-Butanone	mg/kg	NA	4.66E+03	NR				NR				NR				NR			
Acetone	mg/kg	NA	7.76E+02	NR				NR				NR				NR			
Carbon disulfide	mg/kg	NA	7.77E+02	NR				NR				NR				NR			
Dichlorodifluoromethane	mg/kg	NA	1.55E+03	NR				NR				NR				NR			
Methylene chloride	mg/kg	NA	8.41E+01	NR				NR				NR				NR			

Table 5-2

Subsurface Soil Analytical Results
Range 29, Parcel 87Q-X
Fort McClellan, Calhoun County, Alabama

Sample Location				HR-87Q-GP09				HR-87Q-GP10				HR-87Q-MW01				HR-87Q-MW02			
Sample Number				HL0063				HL0065				HL0002				HL0006			
Sample Date				5-Dec-00				4-Dec-00				6-Dec-00				6-Dec-00			
Sample Depth (Feet)				10 - 12				4 - 6				6 - 7				11 - 12			
Parameter	Units	BKG[a]	SSSL[b]	Result	Qual	>BKG	>SSSL	Result	Qual	>BKG	>SSSL	Result	Qual	>BKG	>SSSL	Result	Qual	>BKG	>SSSL
METALS																			
Aluminum	mg/kg	1.36E+04	7.80E+03	6.88E+03				1.17E+04			YES	7.09E+03				1.37E+04		YES	YES
Antimony	mg/kg	1.31E+00	3.11E+00	ND				ND				6.48E+00	J	YES	YES	6.93E+00	J	YES	YES
Arsenic	mg/kg	1.83E+01	4.26E-01	2.29E+00			YES	7.29E+00	J		YES	1.06E+01			YES	1.66E+01			YES
Barium	mg/kg	2.34E+02	5.47E+02	1.86E+01				2.27E+01				2.20E+01	J			1.76E+02	J		
Beryllium	mg/kg	8.60E-01	9.60E+00	2.23E-01	J			2.01E-01	J			2.92E-01	J			3.97E+00	J	YES	
Calcium	mg/kg	6.37E+02	NA	8.23E+01	J			7.90E+01	B			3.78E+02				3.06E+03		YES	
Chromium	mg/kg	3.83E+01	2.32E+01	2.48E+01			YES	2.89E+01	J		YES	2.25E+01	J			2.37E+01	J		YES
Cobalt	mg/kg	1.75E+01	4.68E+02	1.30E+00	J			1.40E+00	J			2.31E+00	J			9.77E+00	J		
Copper	mg/kg	1.94E+01	3.13E+02	9.76E+00				1.29E+01				9.61E+00	J			2.65E+01	J	YES	
Iron	mg/kg	4.48E+04	2.34E+03	2.50E+04			YES	3.35E+04			YES	3.14E+04			YES	4.52E+04		YES	YES
Lead	mg/kg	3.85E+01	4.00E+02	9.54E+00	J			7.32E+00	J			6.63E+00	J			1.73E+01	J		
Magnesium	mg/kg	7.66E+02	NA	8.30E+01	J			2.20E+02				1.33E+02				4.59E+02			
Manganese	mg/kg	1.36E+03	3.63E+02	3.95E+01				2.16E+01				7.49E+01				9.56E+02			YES
Mercury	mg/kg	7.00E-02	2.33E+00	7.60E-02	J	YES		1.43E-01		YES		1.00E-01	J	YES		1.85E-01		YES	
Nickel	mg/kg	1.29E+01	1.54E+02	2.69E+00				2.54E+00				3.63E+00	J			3.15E+01	J	YES	
Potassium	mg/kg	7.11E+02	NA	5.71E+02	J			3.82E+02	J			5.90E+02				4.05E+02	B		
Selenium	mg/kg	4.70E-01	3.91E+01	ND				ND				1.23E+00	J	YES		ND			
Silver	mg/kg	2.40E-01	3.91E+01	ND				9.59E-01	B	YES		4.45E-01	B	YES		ND			
Sodium	mg/kg	7.02E+02	NA	2.70E+01	J			ND				4.37E+01	J			3.50E+01	J		
Thallium	mg/kg	1.40E+00	5.08E-01	1.56E+00	J	YES	YES	1.77E+00	J	YES	YES	1.97E+00	B	YES	YES	3.52E+00		YES	YES
Vanadium	mg/kg	6.49E+01	5.31E+01	1.85E+01				4.72E+01				3.20E+01				4.06E+01			
Zinc	mg/kg	3.49E+01	2.34E+03	7.00E+00				1.60E+01	J			2.62E+01	J			9.29E+01	J	YES	
VOLATILE ORGANIC COMPOUNDS																			
2-Butanone	mg/kg	NA	4.66E+03	NR				NR				NR				NR			
Acetone	mg/kg	NA	7.76E+02	NR				NR				NR				NR			
Carbon disulfide	mg/kg	NA	7.77E+02	NR				NR				NR				NR			
Dichlorodifluoromethane	mg/kg	NA	1.55E+03	NR				NR				NR				NR			
Methylene chloride	mg/kg	NA	8.41E+01	NR				NR				NR				NR			

Table 5-2

Subsurface Soil Analytical Results
Range 29, Parcel 87Q-X
Fort McClellan, Calhoun County, Alabama

Sample Location				HR-87Q-MW03				HR-87Q-MW04				HR-87Q-MW05				HR-87Q-MW09			
Sample Number				HL0008				HL0010				HL0012				HL0021			
Sample Date				5-Dec-00				5-Dec-00				10-Apr-01				5-Dec-00			
Sample Depth (Feet)				5 - 6				3 - 4				9 - 10				4 - 6			
Parameter	Units	BKG[a]	SSSL[b]	Result	Qual	>BKG	>SSSL	Result	Qual	>BKG	>SSSL	Result	Qual	>BKG	>SSSL	Result	Qual	>BKG	>SSSL
METALS																			
Aluminum	mg/kg	1.36E+04	7.80E+03	8.66E+03			YES	8.86E+03			YES	2.60E+04		YES	YES	6.34E+03			
Antimony	mg/kg	1.31E+00	3.11E+00	ND				ND				ND				ND			
Arsenic	mg/kg	1.83E+01	4.26E-01	5.01E+00			YES	3.92E+00			YES	2.34E+01		YES	YES	5.46E+00			YES
Barium	mg/kg	2.34E+02	5.47E+02	4.47E+01				1.93E+01				7.77E+01				1.69E+01			
Beryllium	mg/kg	8.60E-01	9.60E+00	5.33E-01	J			1.36E-01	J			5.41E-01	J			1.95E-01	J		
Calcium	mg/kg	6.37E+02	NA	4.99E+01	J			7.21E+01	J			4.82E+01	J			6.64E+01	J		
Chromium	mg/kg	3.83E+01	2.32E+01	2.06E+01				2.44E+01			YES	2.94E+01			YES	1.41E+01			
Cobalt	mg/kg	1.75E+01	4.68E+02	1.89E+01		YES		1.92E+00	J			3.00E+00				7.06E-01	J		
Copper	mg/kg	1.94E+01	3.13E+02	6.35E+00				1.18E+01				2.90E+01		YES		7.07E+00			
Iron	mg/kg	4.48E+04	2.34E+03	2.77E+04			YES	2.72E+04			YES	5.25E+04		YES	YES	2.78E+04			YES
Lead	mg/kg	3.85E+01	4.00E+02	2.61E+01	J			9.46E+00	J			3.36E+01				5.01E+00	J		
Magnesium	mg/kg	7.66E+02	NA	9.50E+01	J			1.16E+02	J			7.16E+02				1.35E+02			
Manganese	mg/kg	1.36E+03	3.63E+02	1.56E+03		YES	YES	3.31E+01				7.63E+01				1.33E+01			
Mercury	mg/kg	7.00E-02	2.33E+00	4.00E-02	J			2.60E-02	J			3.90E-02	J			5.50E-02	J		
Nickel	mg/kg	1.29E+01	1.54E+02	3.18E+00				2.20E+00	J			1.98E+01		YES		9.93E-01	J		
Potassium	mg/kg	7.11E+02	NA	4.04E+02	J			3.16E+02	J			1.41E+03		YES		5.87E+02	J		
Selenium	mg/kg	4.70E-01	3.91E+01	ND				8.33E-01	B	YES		ND				8.71E-01	B	YES	
Silver	mg/kg	2.40E-01	3.91E+01	ND				ND				ND				ND			
Sodium	mg/kg	7.02E+02	NA	ND				ND				ND				ND			
Thallium	mg/kg	1.40E+00	5.08E-01	2.67E+00		YES	YES	2.16E+00	J	YES	YES	9.32E-01	J		YES	1.61E+00	J	YES	YES
Vanadium	mg/kg	6.49E+01	5.31E+01	2.83E+01				2.52E+01				4.48E+01				1.90E+01			
Zinc	mg/kg	3.49E+01	2.34E+03	1.14E+01				1.73E+01				1.17E+02		YES		1.18E+01			
VOLATILE ORGANIC COMPOUNDS																			
2-Butanone	mg/kg	NA	4.66E+03	NR				NR				NR				NR			
Acetone	mg/kg	NA	7.76E+02	NR				NR				NR				NR			
Carbon disulfide	mg/kg	NA	7.77E+02	NR				NR				NR				NR			
Dichlorodifluoromethane	mg/kg	NA	1.55E+03	NR				NR				NR				NR			
Methylene chloride	mg/kg	NA	8.41E+01	NR				NR				NR				NR			

Table 5-2

Subsurface Soil Analytical Results
Range 29, Parcel 87Q-X
Fort McClellan, Calhoun County, Alabama

Sample Location				HR-87Q-MW10				HR-87Q-MW11				HR-87Q-MW12				HR-87Q-MW13			
Sample Number				HL0029				HL0025				HL0023				HL0031			
Sample Date				5-Dec-00				5-Dec-00				7-Dec-00				5-Dec-00			
Sample Depth (Feet)				4 - 6				4 - 4				2 - 4				5 - 6			
Parameter	Units	BKG[a]	SSSL[b]	Result	Qual	>BKG	>SSSL	Result	Qual	>BKG	>SSSL	Result	Qual	>BKG	>SSSL	Result	Qual	>BKG	>SSSL
METALS																			
Aluminum	mg/kg	1.36E+04	7.80E+03	6.97E+03				7.01E+03				8.58E+03			YES	5.91E+03			
Antimony	mg/kg	1.31E+00	3.11E+00	6.54E+00	J	YES	YES	ND				6.40E+00	J	YES	YES	ND			
Arsenic	mg/kg	1.83E+01	4.26E-01	4.13E+00			YES	8.00E+00			YES	6.14E+00			YES	3.44E+00			YES
Barium	mg/kg	2.34E+02	5.47E+02	1.36E+01				2.28E+01				9.63E+01				3.28E+01			
Beryllium	mg/kg	8.60E-01	9.60E+00	1.29E-01	B			2.16E-01	J			4.39E-01	J			4.41E-01	J		
Calcium	mg/kg	6.37E+02	NA	4.13E+01	J			6.52E+01	J			3.60E+03		YES		2.24E+01	J		
Chromium	mg/kg	3.83E+01	2.32E+01	3.66E+01			YES	2.90E+01			YES	1.84E+01				3.37E+00			
Cobalt	mg/kg	1.75E+01	4.68E+02	1.08E+00	J			1.37E+00	J			8.81E+00				3.36E+00			
Copper	mg/kg	1.94E+01	3.13E+02	4.42E+00				7.79E+00				1.18E+01				1.26E+01			
Iron	mg/kg	4.48E+04	2.34E+03	3.77E+04			YES	3.16E+04			YES	1.73E+04			YES	1.50E+04			YES
Lead	mg/kg	3.85E+01	4.00E+02	9.59E+00	J			8.26E+00	J			1.75E+01				1.87E+01	J		
Magnesium	mg/kg	7.66E+02	NA	6.51E+01	J			1.28E+02				5.64E+02				1.05E+02	J		
Manganese	mg/kg	1.36E+03	3.63E+02	9.64E+01				4.84E+01				5.46E+02			YES	1.03E+02			
Mercury	mg/kg	7.00E-02	2.33E+00	9.80E-02	J	YES		2.09E-01		YES		4.50E-02	J			3.10E-02	J		
Nickel	mg/kg	1.29E+01	1.54E+02	1.07E+00	J			2.36E+00	J			5.61E+00				6.22E+00			
Potassium	mg/kg	7.11E+02	NA	3.48E+02	J			4.39E+02	J			4.88E+02	B			1.08E+03		YES	
Selenium	mg/kg	4.70E-01	3.91E+01	ND				ND				ND				5.81E-01	B	YES	
Silver	mg/kg	2.40E-01	3.91E+01	ND				ND				ND				ND			
Sodium	mg/kg	7.02E+02	NA	ND				ND				ND				ND			
Thallium	mg/kg	1.40E+00	5.08E-01	2.61E+00		YES	YES	2.02E+00	J	YES	YES	1.67E+00	B	YES	YES	1.06E+00	J		YES
Vanadium	mg/kg	6.49E+01	5.31E+01	4.25E+01				2.66E+01				1.91E+01				8.02E+00			
Zinc	mg/kg	3.49E+01	2.34E+03	4.80E+00				9.52E+00				2.61E+01				1.41E+01			
VOLATILE ORGANIC COMPOUNDS																			
2-Butanone	mg/kg	NA	4.66E+03	NR				NR				2.30E-03	J			NR			
Acetone	mg/kg	NA	7.76E+02	NR				NR				3.30E-02	J			NR			
Carbon disulfide	mg/kg	NA	7.77E+02	NR				NR				3.40E-04	J			NR			
Dichlorodifluoromethane	mg/kg	NA	1.55E+03	NR				NR				ND				NR			
Methylene chloride	mg/kg	NA	8.41E+01	NR				NR				1.00E-03	B			NR			

Table 5-2

Subsurface Soil Analytical Results
Range 29, Parcel 87Q-X
Fort McClellan, Calhoun County, Alabama

Sample Location				HR-87Q-MW14				HR-87Q-MW15				HR-87Q-MW16			
Sample Number				HL0033				HL0035				HL0037			
Sample Date				6-Dec-00				6-Dec-00				7-Dec-00			
Sample Depth (Feet)				11 - 12				11 - 12				4 - 5			
Parameter	Units	BKG[a]	SSSL[b]	Result	Qual	>BKG	>SSSL	Result	Qual	>BKG	>SSSL	Result	Qual	>BKG	>SSSL
METALS															
Aluminum	mg/kg	1.36E+04	7.80E+03	1.65E+04		YES	YES	1.19E+04			YES	6.32E+03			
Antimony	mg/kg	1.31E+00	3.11E+00	4.62E+00	J	YES	YES	8.22E+00	J	YES	YES	ND			
Arsenic	mg/kg	1.83E+01	4.26E-01	1.59E+02		YES	YES	1.90E+01		YES	YES	8.42E+00			YES
Barium	mg/kg	2.34E+02	5.47E+02	8.58E+01	J			1.32E+02	J			3.24E+01			
Beryllium	mg/kg	8.60E-01	9.60E+00	1.24E+00	J	YES		9.83E-01	J	YES		1.80E-01	B		
Calcium	mg/kg	6.37E+02	NA	8.94E+02		YES		1.85E+03		YES		1.57E+02			
Chromium	mg/kg	3.83E+01	2.32E+01	2.14E+01	J			2.71E+01	J		YES	1.44E+01			
Cobalt	mg/kg	1.75E+01	4.68E+02	9.69E+00	J			1.11E+01	J			7.64E-01	J		
Copper	mg/kg	1.94E+01	3.13E+02	3.19E+01	J	YES		2.93E+01	J	YES		1.86E+01			
Iron	mg/kg	4.48E+04	2.34E+03	6.14E+04		YES	YES	3.91E+04			YES	2.55E+04			YES
Lead	mg/kg	3.85E+01	4.00E+02	3.12E+01	J			4.92E+01	J	YES		8.99E+00			
Magnesium	mg/kg	7.66E+02	NA	7.88E+02		YES		5.91E+02				1.56E+02			
Manganese	mg/kg	1.36E+03	3.63E+02	1.59E+02				6.39E+02			YES	2.42E+01			
Mercury	mg/kg	7.00E-02	2.33E+00	8.20E-02	J	YES		2.70E-02	J			1.84E-01		YES	
Nickel	mg/kg	1.29E+01	1.54E+02	1.51E+01	J	YES		1.91E+01	J	YES		1.15E+00	J		
Potassium	mg/kg	7.11E+02	NA	9.94E+02		YES		9.73E+02		YES		5.76E+02	B		
Selenium	mg/kg	4.70E-01	3.91E+01	ND				ND				ND			
Silver	mg/kg	2.40E-01	3.91E+01	ND				ND				ND			
Sodium	mg/kg	7.02E+02	NA	3.79E+01	J			3.58E+01	J			ND			
Thallium	mg/kg	1.40E+00	5.08E-01	5.39E+00		YES	YES	3.01E+00		YES	YES	2.00E+00	B	YES	YES
Vanadium	mg/kg	6.49E+01	5.31E+01	3.63E+01				3.17E+01				2.78E+01			
Zinc	mg/kg	3.49E+01	2.34E+03	2.75E+02	J	YES		1.33E+02	J	YES		1.76E+01			
VOLATILE ORGANIC COMPOUNDS															
2-Butanone	mg/kg	NA	4.66E+03	NR				NR				NR			
Acetone	mg/kg	NA	7.76E+02	NR				NR				NR			
Carbon disulfide	mg/kg	NA	7.77E+02	NR				NR				NR			
Dichlorodifluoromethane	mg/kg	NA	1.55E+03	NR				NR				NR			
Methylene chloride	mg/kg	NA	8.41E+01	NR				NR				NR			

Table 5-2

Subsurface Soil Analytical Results
Range 29, Parcel 87Q-X
Fort McClellan, Calhoun County, Alabama

Sample Location				HR-87Q-MW17				HR-87Q-MW18				HR-87Q-MW19			
Sample Number				HL0040				HL0042				HL0067			
Sample Date				7-Dec-00				7-Dec-00				6-Dec-00			
Sample Depth (Feet)				6 - 7				1 - 31				8 - 10			
Parameter	Units	BKG[a]	SSSL[b]	Result	Qual	>BKG	>SSSL	Result	Qual	>BKG	>SSSL	Result	Qual	>BKG	>SSSL
METALS															
Aluminum	mg/kg	1.36E+04	7.80E+03	1.64E+04	J	YES	YES	2.02E+04		YES	YES	1.34E+04			YES
Antimony	mg/kg	1.31E+00	3.11E+00	5.41E+00	J	YES	YES	4.51E+00	J	YES	YES	6.24E+00	J	YES	YES
Arsenic	mg/kg	1.83E+01	4.26E-01	1.81E+01			YES	2.14E+01		YES	YES	1.49E+01			YES
Barium	mg/kg	2.34E+02	5.47E+02	3.64E+02	J	YES		1.39E+02				8.53E+01	J		
Beryllium	mg/kg	8.60E-01	9.60E+00	3.83E+00	J	YES		4.10E+00		YES		1.04E+00	J	YES	
Calcium	mg/kg	6.37E+02	NA	2.26E+03	J	YES		3.77E+03		YES		7.40E+02		YES	
Chromium	mg/kg	3.83E+01	2.32E+01	1.77E+01				2.00E+01				2.64E+01	J		YES
Cobalt	mg/kg	1.75E+01	4.68E+02	1.76E+01		YES		1.39E+01				3.33E+01	J	YES	
Copper	mg/kg	1.94E+01	3.13E+02	2.75E+01	J	YES		2.54E+01		YES		2.39E+01	J	YES	
Iron	mg/kg	4.48E+04	2.34E+03	3.59E+04			YES	5.09E+04		YES	YES	4.84E+04		YES	YES
Lead	mg/kg	3.85E+01	4.00E+02	5.45E+01		YES		4.24E+01		YES		5.82E+01	J	YES	
Magnesium	mg/kg	7.66E+02	NA	1.51E+03	J	YES		2.81E+03		YES		4.79E+02			
Manganese	mg/kg	1.36E+03	3.63E+02	3.96E+03		YES	YES	1.50E+03		YES	YES	7.01E+02			YES
Mercury	mg/kg	7.00E-02	2.33E+00	4.70E-02	J			1.45E-01		YES		8.50E-02	J	YES	
Nickel	mg/kg	1.29E+01	1.54E+02	1.94E+01	J	YES		2.37E+01		YES		1.59E+01	J	YES	
Potassium	mg/kg	7.11E+02	NA	9.43E+02	J	YES		1.19E+03		YES		9.29E+02		YES	
Selenium	mg/kg	4.70E-01	3.91E+01	ND				ND				ND			
Silver	mg/kg	2.40E-01	3.91E+01	ND				ND				ND			
Sodium	mg/kg	7.02E+02	NA	ND				ND				3.06E+01	J		
Thallium	mg/kg	1.40E+00	5.08E-01	6.09E+00	B	YES	YES	7.43E+00	B	YES	YES	4.40E+00		YES	YES
Vanadium	mg/kg	6.49E+01	5.31E+01	2.49E+01	J			4.26E+01				4.30E+01			
Zinc	mg/kg	3.49E+01	2.34E+03	1.04E+02		YES		1.42E+02		YES		7.52E+01	J	YES	
VOLATILE ORGANIC COMPOUNDS															
2-Butanone	mg/kg	NA	4.66E+03	NR				NR				ND			
Acetone	mg/kg	NA	7.76E+02	NR				NR				1.70E-02	J		
Carbon disulfide	mg/kg	NA	7.77E+02	NR				NR				ND			
Dichlorodifluoromethane	mg/kg	NA	1.55E+03	NR				NR				1.30E-02	B		
Methylene chloride	mg/kg	NA	8.41E+01	NR				NR				1.50E-03	B		

Table 5-2

Subsurface Soil Analytical Results
Range 29, Parcel 87Q-X
Fort McClellan, Calhoun County, Alabama

Analyses performed using U.S. Environmental Protection Agency (EPA) SW-846 analytical methods.

[a] Bkg - Background. Concentration listed is two times (2x) the arithmetic mean of background metals concentration given in Science Applications International Corporation (1998), *Final Background Metals Survey Report, Fort McClellan, Alabama*, July.

[b] Residential human health site-specific screening level (SSSL) as given in IT Corporation (2000), *Final Human Health and Ecological Screening Values and PAH Background Summary Report, Fort McClellan, Calhoun County, Alabama*, July.

B - Analyte detected in laboratory or field blank at concentration greater than the reporting limit (and greater than zero).

J - Compound was positively identified; reported value is the estimated concentration.

mg/kg - Milligrams per kilogram.

NA - Not available.

ND - Not detected.

NR - Not requested.

Qual - Data validation qualifier.

Table 5-3

Groundwater Analytical Results
Range 29, Parcel 87Q-X
Fort McClellan, Calhoun County, Alabama

Sample Location				HR-87Q-MW05				HR-87Q-MW05				HR-87Q-MW12				HR-87Q-MW14				HR-87Q-MW14			
Sample Number				HL3006				HL3006R				HL3013				HL3017				HL3017R			
Sample Date				1-Jun-01				31-Jul-01				22-May-01				10-May-01				30-Jul-01			
Parameter	Units	BKG[a]	SSSL[b]	Result	Qual	>BKG	>SSSL	Result	Qual	>BKG	>SSSL	Result	Qual	>BKG	>SSSL	Result	Qual	>BKG	>SSSL	Result	Qual	>BKG	>SSSL
METALS																							
Aluminum	mg/L	2.34E+00	1.56E+00	5.85E-01				NR				1.06E+00	J			9.83E-01				NR			
Barium	mg/L	1.27E-01	1.10E-01	4.43E-02	J			NR				1.47E-01		YES	YES	1.32E-02				NR			
Beryllium	mg/L	1.24E-03	3.12E-03	7.40E-04	J			NR				ND				ND				NR			
Calcium	mg/L	5.65E+01	NA	7.08E+01		YES		NR				2.28E+01				1.05E+01				NR			
Cobalt	mg/L	2.34E-02	9.39E-02	8.60E-03	J			NR				1.10E-01		YES	YES	ND				NR			
Iron	mg/L	7.04E+00	4.69E-01	4.33E-01				NR				6.18E-01			YES	5.78E-01			YES	NR			
Lead	mg/L	7.99E-03	1.50E-02	ND				NR				1.26E-02		YES		ND				NR			
Magnesium	mg/L	2.13E+01	NA	5.99E+00				NR				4.47E+00				2.08E+00				NR			
Manganese	mg/L	5.81E-01	7.35E-02	1.53E-01			YES	NR				2.29E+00		YES	YES	5.85E-02				NR			
Mercury	mg/L	NA	4.69E-04	ND				NR				1.58E-04	J			ND				NR			
Potassium	mg/L	7.20E+00	NA	4.24E-01	J			NR				ND				ND				NR			
Selenium	mg/L	NA	7.82E-03	ND				NR				1.98E-03	J			ND				NR			
Sodium	mg/L	1.48E+01	NA	3.08E+00	J			NR				2.47E+00				1.89E+00				NR			
Thallium	mg/L	1.45E-03	1.02E-04	ND				NR				8.13E-03	J	YES	YES	ND				NR			
Zinc	mg/L	2.20E-01	4.69E-01	1.86E-02	J			NR				2.80E-02				1.58E-02	J			NR			
PESTICIDES																							
4,4'-DDD	mg/L	NA	1.83E-04	NR				9.00E-05	J			7.30E-05	J			NR				ND			
4,4'-DDE	mg/L	NA	1.36E-04	NR				ND				3.50E-05	J			NR				ND			
4,4'-DDT	mg/L	NA	1.09E-04	NR				ND				1.20E-04	J		YES	NR				1.00E-04	J		
Dieldrin	mg/L	NA	3.97E-06	NR				ND				4.30E-05	J		YES	NR				ND			
Endosulfan II	mg/L	NA	9.35E-03	NR				ND				4.40E-05	J			NR				ND			
Endrin	mg/L	NA	4.48E-04	NR				5.00E-05	J			9.50E-05	J			NR				ND			
Endrin aldehyde	mg/L	NA	3.75E-05	NR				ND				1.20E-04	J		YES	NR				2.30E-05	J		
Heptachlor	mg/L	NA	1.46E-05	NR				4.60E-05	B		YES	ND				NR				3.70E-05	B		YES
Heptachlor epoxide	mg/L	NA	6.63E-06	NR				ND				2.00E-04			YES	NR				ND			
Methoxychlor	mg/L	NA	7.55E-03	NR				ND				ND				NR				1.70E-04	J		
alpha-Chlordane	mg/L	NA	NA	NR				8.70E-05	J			6.70E-05	J			NR				4.90E-05	J		
beta-BHC	mg/L	NA	3.61E-05	NR				1.30E-05	J			4.10E-05	J		YES	NR				2.50E-05	J		
delta-BHC	mg/L	NA	4.49E-04	NR				ND				4.80E-05	J			NR				ND			
gamma-Chlordane	mg/L	NA	NA	NR				5.30E-05	J			ND				NR				2.40E-05	J		
HERBICIDES																							
2,2-Dichloropropanoic Acid	mg/L	NA	4.68E-02	NR				ND				1.40E-04	J			NR				ND			
2,4-D	mg/L	NA	1.55E-02	NR				ND				1.30E-04	J			NR				ND			
2,4-DB	mg/L	NA	1.24E-02	NR				ND				1.10E-03				NR				ND			
Dinoseb	mg/L	NA	1.56E-01	NR				1.20E-04	J			8.80E-05	J			NR				ND			
MCPA	mg/L	NA	7.78E-04	NR				ND				1.70E-01			YES	NR				ND			
MCPP	mg/L	NA	1.52E-03	NR				ND				2.80E-02	J		YES	NR				ND			
EXPLOSIVES																							
1,3,5-Trinitrobenzene	mg/L	NA	4.69E-02	ND				NR				2.70E-04	J			ND				NR			
2-Nitrotoluene	mg/L	NA	1.53E-02	ND				NR				2.00E-03				ND				NR			
HMX	mg/L	NA	7.82E-02	ND				NR				1.20E-03	J			ND				NR			
Tetryl	mg/L	NA	1.56E-02	ND				NR				2.00E-04	J			ND				NR			

Table 5-3

Groundwater Analytical Results
Range 29, Parcel 87Q-X
Fort McClellan, Calhoun County, Alabama

Sample Location				HR-87Q-MW15				HR-87Q-MW15			
Sample Number				HL3018				HL3018R			
Sample Date				18-May-01				30-Jul-01			
Parameter	Units	BKG[a]	SSSL[b]	Result	Qual	>BKG	>SSSL	Result	Qual	>BKG	>SSSL
METALS											
Aluminum	mg/L	2.34E+00	1.56E+00	2.31E-01				NR			
Barium	mg/L	1.27E-01	1.10E-01	9.22E-02				NR			
Beryllium	mg/L	1.24E-03	3.12E-03	ND				NR			
Calcium	mg/L	5.65E+01	NA	5.69E+01		YES		NR			
Cobalt	mg/L	2.34E-02	9.39E-02	ND				NR			
Iron	mg/L	7.04E+00	4.69E-01	3.13E-01				NR			
Lead	mg/L	7.99E-03	1.50E-02	ND				NR			
Magnesium	mg/L	2.13E+01	NA	5.50E+00				NR			
Manganese	mg/L	5.81E-01	7.35E-02	9.26E-03	J			NR			
Mercury	mg/L	NA	4.69E-04	ND				NR			
Potassium	mg/L	7.20E+00	NA	ND				NR			
Selenium	mg/L	NA	7.82E-03	1.81E-03	J			NR			
Sodium	mg/L	1.48E+01	NA	1.26E+00				NR			
Thallium	mg/L	1.45E-03	1.02E-04	ND				NR			
Zinc	mg/L	2.20E-01	4.69E-01	ND				NR			
PESTICIDES											
4,4'-DDD	mg/L	NA	1.83E-04	NR				ND			
4,4'-DDE	mg/L	NA	1.36E-04	NR				ND			
4,4'-DDT	mg/L	NA	1.09E-04	NR				ND			
Dieldrin	mg/L	NA	3.97E-06	NR				ND			
Endosulfan II	mg/L	NA	9.35E-03	NR				ND			
Endrin	mg/L	NA	4.48E-04	NR				ND			
Endrin aldehyde	mg/L	NA	3.75E-05	NR				ND			
Heptachlor	mg/L	NA	1.46E-05	NR				3.00E-05	B		YES
Heptachlor epoxide	mg/L	NA	6.63E-06	NR				ND			
Methoxychlor	mg/L	NA	7.55E-03	NR				ND			
alpha-Chlordane	mg/L	NA	NA	NR				2.00E-05	J		
beta-BHC	mg/L	NA	3.61E-05	NR				ND			
delta-BHC	mg/L	NA	4.49E-04	NR				ND			
gamma-Chlordane	mg/L	NA	NA	NR				1.30E-05	J		
HERBICIDES											
2,2-Dichloropropanoic Acid	mg/L	NA	4.68E-02	NR				ND			
2,4-D	mg/L	NA	1.55E-02	NR				ND			
2,4-DB	mg/L	NA	1.24E-02	NR				ND			
Dinoseb	mg/L	NA	1.56E-01	NR				ND			
MCPA	mg/L	NA	7.78E-04	NR				ND			
MCPP	mg/L	NA	1.52E-03	NR				ND			
EXPLOSIVES											
1,3,5-Trinitrobenzene	mg/L	NA	4.69E-02	ND				NR			
2-Nitrotoluene	mg/L	NA	1.53E-02	ND				NR			
HMX	mg/L	NA	7.82E-02	ND				NR			
Tetryl	mg/L	NA	1.56E-02	ND				NR			

Table 5-3

Groundwater Analytical Results
Range 29, Parcel 87Q-X
Fort McClellan, Calhoun County, Alabama

Analyses performed using U.S. Environmental Protection Agency (EPA) SW-846 analytical methods.

[a] Bkg - Background. Concentration listed is two times (2x) the arithmetic mean of background metals concentration given in Science Applications International Corporation (1998), *Final Background Metals Survey Report, Fort McClellan, Alabama*, July.

[b] Residential human health site-specific screening level (SSSL) as given in IT Corporation (2000), *Final Human Health and Ecological Screening Values and PAH Background Summary Report, Fort McClellan, Calhoun County, Alabama*, July.

B - Analyte detected in laboratory or field blank at concentration greater than the reporting limit (and greater than zero).

J - Compound was positively identified; reported value is the estimated concentration.

mg/L - Milligrams per liter.

NA - Not available.

ND - Not detected.

NR - Not requested.

Qual - Data validation qualifier.

Table 5-4

Surface Water Analytical Results
Range 29, Parcel 87Q-X
Fort McClellan, Calhoun County, Alabama

Sample Location					HR-87Q-SW/SD06				
Sample Number					HL2006				
Sample Date					17-Jan-01				
Parameter	Units	BKG[a]	SSSL[b]	ESV[b]	Result	Qual	>BKG	>SSSL	>ESV
METALS									
Aluminum	mg/L	5.26E+00	1.53E+01	8.70E-02	4.81E-02	J			
Barium	mg/L	7.53E-02	1.10E+00	3.90E-03	8.69E-02		YES		YES
Calcium	mg/L	2.52E+01	NA	1.16E+02	7.56E+01		YES		
Iron	mg/L	1.96E+01	4.70E+00	1.00E+00	1.21E-01	J			
Lead	mg/L	8.60E-03	1.50E-02	1.32E-03	3.17E-03	B			YES
Magnesium	mg/L	1.10E+01	NA	8.20E+01	4.61E+00				
Manganese	mg/L	5.65E-01	6.40E-01	8.00E-02	2.00E-02				
Sodium	mg/L	3.44E+00	NA	6.80E+02	1.22E+00				

Analyses performed using U.S. Environmental Protection Agency (EPA) SW-846 analytical methods.

[a] Bkg - Background. Concentration listed is two times (2x) the arithmetic mean of background metals concentration given in Science Applications International Corporation (1998), *Final Background Metals Survey Report, Fort McClellan, Alabama,* July.

[b] Recreational site user site-specific screening level (SSSL) and ecological screening value (ESV) as given in IT Corporation (2000), *Final Human Health and Ecological Screening Values and PAH Background Summary Report, Fort McClellan, Calhoun County, Alabama,* July.

B - Analyte detected in laboratory or field blank at concentration greater than the reporting limit (and greater than zero).

J - Compound was positively identified; reported value is the estimated concentration.

mg/L - Milligrams per liter.

NA - Not available.

ND - Not detected.

Qual - Data validation qualifier.

Table 5-5

Sediment Analytical Results
Range 29, Parcel 87Q-X
Fort McClellan, Calhoun County, Alabama

Sample Location					HR-87Q-SW/SD06				
Sample Number					HL1006				
Sample Date					17-Jan-01				
Sample Depth (Feet)					0- 0.5				
Parameter	**Units**	**BKG[a]**	**SSSL[b]**	**ESV[b]**	**Result**	**Qual**	**>BKG**	**>SSSL**	**>ESV**
METALS									
Aluminum	mg/kg	8.59E+03	1.15E+06		7.52E+03				
Antimony	mg/kg	7.30E-01	4.22E+02	1.20E+01	5.41E+00	J	YES		
Arsenic	mg/kg	1.13E+01	5.58E+01	7.24E+00	1.68E+01		YES		YES
Barium	mg/kg	9.89E+01	8.36E+04	NA	3.40E+02		YES		
Beryllium	mg/kg	9.70E-01	1.50E+02	NA	1.08E+00	J	YES		
Calcium	mg/kg	1.11E+03	NA	NA	1.32E+03		YES		
Chromium	mg/kg	3.12E+01	2.79E+03	5.23E+01	6.59E+01		YES		YES
Cobalt	mg/kg	1.10E+01	6.72E+04	5.00E+01	3.86E+01		YES		
Copper	mg/kg	1.71E+01	4.74E+04	1.87E+01	2.51E+01		YES		YES
Iron	mg/kg	3.53E+04	3.59E+05	NA	5.30E+04		YES		
Lead	mg/kg	3.78E+01	4.00E+02	3.02E+01	2.13E+02		YES		YES
Magnesium	mg/kg	9.06E+02	NA	NA	2.51E+02				
Manganese	mg/kg	7.12E+02	4.38E+04	NA	2.87E+03		YES		
Nickel	mg/kg	1.30E+01	1.76E+04	1.59E+01	1.26E+01				
Potassium	mg/kg	1.01E+03	NA	NA	5.42E+02	B			
Thallium	mg/kg	1.30E-01	7.78E+01	NA	1.99E+00	J	YES		
Vanadium	mg/kg	4.09E+01	4.83E+03	NA	4.43E+01		YES		
Zinc	mg/kg	5.27E+01	3.44E+05	1.24E+02	5.63E+01		YES		
TOTAL ORGANIC CARBON									
Total Organic Carbon	mg/kg	NA	NA	NA	6.76E+01				

Analyses performed using U.S. Environmental Protection Agency (EPA) SW-846 analytical methods.

[a] Bkg - Background. Concentration listed is two times (2x) the arithmetic mean of background metals concentration given in Science Applications International Corporation (1998), *Final Background Metals Survey Report, Fort McClellan, Alabama,* July.

[b] Recreational site user site-specific screening level (SSSL) and ecological screening value (ESV) as given in IT Corporation (2000), *Final Human Health and Ecological Screening Values and PAH Background Summary Report, Fort McClellan, Calhoun County, Alabama,* July.

B - Analyte detected in laboratory or field blank at concentration greater than the reporting limit (and greater than zero).

J - Compound was positively identified; reported value is the estimated concentration.

mg/kg - Milligrams per kilogram.

NA - Not available.

ND - Not detected.

Qual - Data validation qualifier.

The concentrations of 13 metals exceeded ESVs and their respective background concentrations: aluminum (at five locations), antimony (nine locations), arsenic (four locations), barium (five locations), beryllium (five locations), chromium (HR-87Q-DEP01 and HR-87Q-DEP02), cobalt (HR-87Q-DEP05), copper (HR-87Q-DEP02), iron (eight locations), lead (ten locations), manganese (four locations), thallium (HR-87Q-MW17 and HR-87Q-MW18), and zinc (seven locations).

Of the metals exceeding ESVs and background concentrations, antimony (at nine locations), barium (HR-87Q-MW18), copper (HR-87Q-DEP02), lead (four locations), and beryllium (five locations) also exceeded the range of background values. However, with the exception of the aforementioned barium result, all metals exceeding the range of background values were flagged with a "J" data qualifier, signifying that the result is greater than the method detection limit, but less than or equal to the reporting limit.

Volatile Organic Compounds. Two surface soil samples (HR-87Q-MW12 and HR-87Q-MW19) were analyzed for VOCs at Range 29. A total of six VOCs were detected in the samples. Three VOCs (2-butanone, acetone, and methylene chloride) were detected in both samples. Benzene, dichlorodifluoromethane, and trichloroethene were only detected in sample HR-87Q-MW19. All of the VOC results were below SSSLs. The trichloroethene result (0.0029 mg/kg) at HR-87Q-MW19 exceeded its ESV (0.001 mg/kg); however, the result was flagged with a "J" data qualifier indicating that the concentration was estimated.

Herbicides. One surface soil sample (HR-87Q-MW12) was analyzed for herbicides. At this location, two herbicides (2,4-D and MCPA) were detected. Both results were flagged with a "J" data qualifier, signifying that the compounds were positively identified but the concentrations were estimated. The herbicide results were below SSSLs; however, the MCPA result (0.99 mg/kg) exceeded its ESV (0.1 mg/kg).

Perchlorate. Perchlorate was detected in one surface soil sample (HR-87Q-MW03) at a concentration below its SSSL. An ESV is not available for perchlorate.

Total Organic Carbon. Four depositional soil samples (HR-87Q-DEP01, HR-87Q-DEP02, HR-87Q-DEP03, and HR-87Q-DEP04) were analyzed for TOC. TOC concentrations in the samples ranged from 18.3 mg/kg to 43.7 mg/kg, as summarized in Appendix F.

Grain Size. Four depositional soil samples were analyzed for grain size. The grain size results are included in Appendix F.

5.2 Subsurface Soil Analytical Results

Twenty-six subsurface soil samples were collected for chemical analysis at Range 29. Subsurface soil samples were collected at depths greater than 1-foot bgs at the locations shown on Figure 3-1. Metals and VOCs were the only detected chemical constituents in subsurface soils. Analytical results were compared to residential human health SSSLs and metals background screening values, as presented in Table 5-2.

Metals. Twenty-two metals were detected in subsurface soil samples collected at Range 29. The concentrations of eight metals exceeded SSSLs and their respective background concentrations: aluminum (at seven locations), antimony (ten locations), arsenic (six locations), chromium (HR-87Q-GP04 and HR-87Q-GP07), iron (ten locations), manganese (four locations), thallium (24 locations), and vanadium (HR-87Q-GP06).

The concentrations of these metals were within the range of background established by SAIC (Appendix H) except for the following:

- Aluminum (26,000 mg/kg) exceeded its SSSL (7,830 mg/kg) and background range (24,600 mg/kg) in one sample (HR-87Q-MW05)
- Antimony (4.51 to 8.22 mg/kg) exceeded its SSSL (3.11 mg/kg) and background range (0.99 mg/kg) in ten samples
- Arsenic (53 and 159 mg/kg) exceeded its SSSL (0.426 mg/kg) and background range (38 mg/kg) in two samples (HR-87Q-GP06 and HR-87Q-MW14)
- Iron (48,200 to 80,000 mg/kg) exceeded its SSSL (2,340 mg/kg) and background range (48,000 mg/kg) in eight samples.

Volatile Organic Compounds. Two subsurface soil samples (HR-87Q-MW12 and HR-87Q-MW19) were analyzed for VOCs. A total of five VOCs (2-butanone, acetone, carbon disulfide, dichlorodifluoromethane, and methylene chloride) were detected in the samples. The 2-butonone, acetone, and carbon disulfide results were flagged with a "J" data qualifier, signifying that the results were estimated. The dichlorodifluoromethane and methylene chloride results were flagged with a "B" data qualifier, signifying that these compounds were also detected in an associated laboratory or field blank sample. The VOC results were below SSSLs.

5.3 Groundwater Analytical Results

A total of seven groundwater samples were collected from the four monitoring wells at Range 29, at the locations shown on Figure 3-1. Metals, pesticides, herbicides, and explosives were detected in groundwater. Analytical results were compared to residential human health SSSLs and metals background screening values, as presented in Table 5-3.

Metals. Fifteen metals were detected in groundwater samples collected at Range 29. The concentrations of five metals (barium, cobalt, iron, manganese, and thallium) exceeded SSSLs. Of these metals, barium, cobalt, manganese, and thallium also exceeded their respective background concentrations in one sample (HR-87Q-MW12). With the exception of the cobalt and thallium results, these metals concentrations were within the range of background values (Appendix H).

Pesticides. Fourteen pesticides were detected in groundwater samples collected at Range 29. The heptachlor results were flagged with a "B" data qualifier indicating that the compound was also detected in an associated laboratory or field blank sample. All but one of the remaining pesticide results were flagged with a "J" data qualifier indicating that the compounds were positively identified but the concentrations were estimated.

The concentrations of six pesticides (4,4'-DDT, dieldrin, endrin aldehyde, heptachlor, heptachlor epoxide, and beta-BHC) exceeded SSSLs. With the exception of the "B"-flagged heptachlor results, which exceeded the SSSL in three samples (HR-87Q-MW05, HR-87Q-MW14, and HR-87Q-MW15), the pesticides that exceeded SSSLs were present in the sample collected from monitoring well HR-87Q-MW12.

Herbicides. Six herbicides (2,2-dichloropropanoic acid, 2,4-D, 2,4-DB, dinoseb, MCPA, and MCPP) were detected in groundwater samples collected at Range 29. With the exception of dinoseb, which was detected in two samples, all of the detected herbicides were present in the sample collected from monitoring well HR-87Q-MW12. The 2,2-dichloropropanoic acid, 2,4-D, dinoseb, and MCPP results were flagged with a "J" data qualifier indicating that the compounds were positively identified but the concentrations were estimated. The MCPA and MCPP concentrations exceeded their respective SSSLs.

Explosives. Four explosives (1,3,5-trinitrobenzene, 2-nitrotoluene, HMX, and tetryl) were detected in one of the groundwater samples (HR-87Q-MW12) collected at the site. Explosives were not detected in the remaining groundwater samples. The 1,3,5-trinitrobenzene, HMX, and

tetryl results were flagged with a "J" data qualifier, indicating that the compounds were positively identified but the concentrations were estimated. The explosives results were below SSSLs.

5.4 Surface Water Analytical Results

One surface water sample was collected for chemical analysis at Range 29, at the location shown on Figure 3-1. Metals were the only detected chemical constituents in surface water. Analytical results were compared to recreational site user human health SSSLs, ESVs, and metals background screening values, as presented in Table 5-4.

Metals. Eight metals were detected in the surface water sample collected at Range 29. The metal concentrations were below SSSLs. The concentrations of two metals (barium and lead) exceeded ESVs. The lead concentration was below its respective background concentration. The barium concentration exceeded its respective background concentration but was within the range of background values established by SAIC (Appendix H).

5.5 Sediment Analytical Results

One sediment sample was collected for chemical analysis at Range 29 at the location shown on Figure 3-1. Metals were the only detected chemical constituents in sediment. Analytical results were compared to recreational site user human health SSSLs, ESVs, and metals background screening values, as presented in Table 5-5.

Metals. Eighteen metals were detected in the sediment sample collected at Range 29. The metals results were below SSSLs. The concentrations of four metals (arsenic, chromium, copper, and lead) exceeded ESVs and their respective background concentrations. The arsenic and copper results were within the range of background values. The chromium (65.9 mg/kg) and lead (213 mg/kg) results exceeded their respective background ranges (63 mg/kg and 110 mg/kg) (Appendix H).

Total Organic Carbon. The sediment sample was analyzed for TOC. The TOC concentration in the sample was 67.6 mg/kg, as summarized in Appendix F.

Grain Size. The results of grain size analysis for the sediment sample are included in Appendix F.

6.0 Summary, Conclusions, and Recommendations

IT, under contract to USACE, completed an SI at Range 29 at FTMC in Calhoun County, Alabama. The SI was conducted to determine whether chemical constituents are present at the site, and, if present, whether the concentrations present an unacceptable risk to human health or the environment. The SI at Range 29 consisted of the sampling and analysis of 33 surface and depositional soil samples, 26 subsurface soil samples, seven groundwater samples, and one surface water/sediment sample. In addition, 16 permanent monitoring wells were installed at the site to facilitate groundwater sample collection and to provide site-specific geological and hydrogeological characterization information. However, twelve of the wells were either dry or did not produce sufficient water for sampling.

Chemical analysis of samples collected Range 29 indicates that metals, VOCs, perchlorate, herbicides, pesticides, and explosive compounds were detected in the environmental media sampled. SVOCs and PCBs were not detected in the samples collected. Analytical results were compared to the SSSLs and ESVs for FTMC. The SSSLs and ESVs were developed by IT for human health and ecological risk evaluations as part of the ongoing SIs being performed under the BRAC Environmental Restoration Program at FTMC. Additionally, metals concentrations exceeding SSSLs and ESVs were compared to media-specific background screening values (SAIC, 1998). The results are summarized as follows:

Surface and Depositional Soils. Antimony concentrations exceeded the SSSL and background range at nine locations. In addition, antimony, barium, copper, lead, and beryllium exceeded ESVs and the range of background.

Subsurface Soils. Aluminum, antimony, arsenic, and iron concentrations exceeded SSSLs and the range of background values at some locations.

Groundwater. Cobalt and thallium exceeded SSSLs and the range of background values in monitoring well HR-87Q-MW12. Two herbicides (MCPA and MCPP) concentrations exceeded SSSLs in monitoring well HR-87Q-MW12. Six pesticides (4,4'-DDT, dieldrin, endrin aldehyde, heptachlor, heptachlor epoxide, and beta-BHC) were detected in HR-87Q-MW12 at concentrations exceeding SSSLs.

Sediment. Chromium and lead concentrations exceeded ESVs and the range of background values.

Based on analytical data collected during the SI, contamination is present at Range 29. In addition, although samples could not be collected in the Parcel 87Q-X ordnance impact area because of UXO issues, the area was observed to contain numerous bullet fragments. It is likely that soils in this area are contaminated with certain metals (e.g., lead, antimony, copper) associated with small-arms ammunition. Therefore, IT recommends that a remedial investigation (RI) be conducted to determine the nature and extent of contamination at the site. Specifically, the RI should focus on pesticide/herbicide contamination in groundwater, and on metals contamination in soils and sediments, particularly in the ordnance impact areas.

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ATTACHMENT 1

LIST OF ABBREVIATIONS AND ACRONYMS

List of Abbreviations and Acronyms

2,4-D	2,4-dichlorophenoxyacetic acid
2,4,5-T	2,4,5-trichlorophenoxyacetic acid
2,4,5-TP	silvex
3D	3D International Environmental Group
AbD3	Anniston and Allen gravelly clay loams, 10 to 15 percent slopes, eroded
Abs	skin absorption
AC	hydrogen cyanide
AcB2	Anniston and Allen gravelly loams, 2 to 6 percent slopes, eroded
AcC2	Anniston and Allen gravelly loams, 6 to 10 percent slopes, eroded
AcD2	Anniston and Allen gravelly loams, 10 to 15 percent slopes, eroded
AcE2	Anniston and Allen gravelly loams, 15 to 25 percent slopes, eroded
ACGIH	American Conference of Governmental Industrial Hygienists
ADEM	Alabama Department of Environmental Management
ADPH	Alabama Department of Public Health
AEC	U.S. Army Environmental Center
AEL	airborne exposure limit
AET	adverse effect threshold
AHA	ammunition holding area
AL	Alabama
ALAD	-aminolevulinic acid dehydratase
amb.	Amber
amsl	above mean sea level
ANAD	Anniston Army Depot
AOC	area of concern
APT	armor-piercing tracer
ARAR	applicable or relevant and appropriate requirement
AREE	area requiring environmental evaluation
ASP	Ammunition Supply Point
ASR	Archives Search Report
AST	aboveground storage tank
ASTM	American Society for Testing and Materials
ATSDR	Agency for Toxic Substances and Disease Registry
ATV	all-terrain vehicle
AWARE	Associated Water and Air Resources Engineers, Inc.
AWWSB	Anniston Water Works and Sewer Board
‘B’	Analyte detected in laboratory or field blank at concentration greater than the reporting limit (and greater than zero)
BCF	blank correction factor
BCT	BRAC Cleanup Team
BERA	baseline ecological risk assessment
BEHP	bis(2-ethylhexyl)phthalate
BFB	bromofluorobenzene
BFE	base flood elevation
BG	Bacillus globigii
bgs	below ground surface
BHC	betahexachlorocyclohexane
bkg	background
bls	below land surface
BOD	biological oxygen demand
BRAC	Base Realignment and Closure
Braun	Braun Intertec Corporation
BSC	background screening criterion
BTAG	Biological Technical Assistance Group
BTEX	benzene, toluene, ethyl benzene, and xylenes
BTOC	below top of casing
BTV	background threshold value
BW	biological warfare
BZ	breathing zone; 3-quinuclidinyl benzilate
C	ceiling limit value
Ca	carcinogen
CAB	chemical warfare agent breakdown products
CAMU	corrective action management unit
CCAL	continuing calibration
CCB	continuing calibration blank
CD	compact disc
CDTF	Chemical Defense Training Facility
CEHNC	U.S. Army Engineering and Support Center, Huntsville
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CERFA	Community Environmental Response Facilitation Act
CESAS	Corps of Engineers South Atlantic Savannah
CG	carbonyl chloride (phosgene)
CFC	chlorofluorocarbon
CFDP	Center for Domestic Preparedness
ch	inorganic clays of high plasticity
CHPPM	U.S. Army Center for Health Promotion and Preventive Medicine
CK	cyanogen chloride
cl	inorganic clays of low to medium plasticity
Cl.	chlorinated
CLP	Contract Laboratory Program
CN	chloroacetophenone
CNB	chloroacetophenone, benzene, and carbon tetrachloride
CNS	chloroacetophenone, chloropicrin, and chloroform
Co-60	cobalt-60
CoA	Code of Alabama
COC	chain of custody; contaminant of concern
COE	Corps of Engineers
Con	skin or eye contact
COPC	chemical(s) of potential concern
COPEC	chemical(s) of potential environmental concern
CQCSM	Contract Quality Control System Manager
CRL	certified reporting limit
CRZ	contamination reduction zone
Cs-137	cesium-137
CS	ortho-chlorobenzylidene-malononitrile
CSEM	conceptual site exposure model
ctr.	container
CWA	chemical warfare agent
CWM	chemical warfare material; clear, wide mouth
CX	dichloroformoxime
‘D’	duplicate; dilution
DAF	dilution-attenuation factor
DANC	decontamination agent, non-corrosive
ºC	degrees Celsius
ºF	degrees Fahrenheit
DCE	dichloroethene
DDD	dichlorodiphenyldichloroethane
DDE	dichlorodiphenyldichloroethene
DDT	dichlorodiphenyltrichloroethane
DEH	Directorate of Engineering and Housing
DEP	depositional soil
DI	deionized
DID	data item description
DIMP	di-isopropylmethylphosphonate
DMBA	dimethylbenz(a)anthracene
DMMP	dimethylmethylphosphonate
DOD	U.S. Department of Defense
DOJ	U.S. Department of Justice
DOT	U.S. Department of Transportation
DP	direct-push
DPDO	Defense Property Disposal Office
DPT	direct-push technology
DQO	data quality objective
DRMO	Defense Reutilization and Marketing Office
DRO	diesel range organics
DS	deep (subsurface) soil
DS2	Decontamination Solution Number 2
DWEL	drinking water equivalent level
E&E	Ecology and Environment, Inc.
EBS	environmental baseline survey
EC_{50}	effects concentration for 50 percent of a population
ECBC	Edgewood Chemical/Biological Command
EDQL	ecological data quality level
EE/CA	engineering evaluation and cost analysis
Elev.	elevation
EM	electromagnetic
EMI	Environmental Management Inc.
EM31	Geonics Limited EM31 Terrain Conductivity Meter
EM61	Geonics Limited EM61 High-Resolution Metal Detector
EOD	explosive ordnance disposal
EODT	explosive ordnance disposal team
EPA	U.S. Environmental Protection Agency
EPC	exposure point concentration
EPIC	Environmental Photographic Interpretation Center
ER	equipment rinsate

ER-L	effects range-low
ER-M	effects range-medium
ESE	Environmental Science and Engineering, Inc.
ESN	Environmental Services Network, Inc.
ESV	ecological screening value
Exp.	explosives
E-W	east to west
EZ	exclusion zone
FAR	Federal Acquisition Regulations
FB	field blank
FD	field duplicate
FDA	U.S. Food and Drug Administration
FedEx	Federal Express, Inc.
FEMA	Federal Emergency Management Agency
FFE	field flame expedient
Fil	filtered
Flt	filtered
FMDC	Fort McClellan Development Commission
FML	flexible membrane liner
FMP 1300	Former Motor Pool 1300
FOMRA	Former Ordnance Motor Repair Area
Foster Wheeler	Foster Wheeler Environmental Corporation
Frtn	fraction
FS	field split; feasibility study
FSP	field sampling plan
ft	feet
ft/ft	feet per foot
FTA	Fire Training Area
FTMC	Fort McClellan
FTRRA	FTMC Reuse & Redevelopment Authority
g	gram
g/m^3	gram per cubic meter
G-856	Geometrics, Inc. G-856 magnetometer
G-858G	Geometrics, Inc. G-858G magnetic gradiometer
gal	gallon
gal/min	gallons per minute
GB	sarin
gc	clay gravels; gravel-sand-clay mixtures
GC	gas chromatograph
GCL	geosynthetic clay liner
GC/MS	gas chromatograph/mass spectrometer
GCR	geosynthetic clay liner
GFAA	graphite furnace atomic absorption
GIS	Geographic Information System
gm	silty gravels; gravel-sand-silt mixtures
gp	poorly graded gravels; gravel-sand mixtures
gpm	gallons per minute
GPR	ground-penetrating radar
GPS	global positioning system
GS	ground scar
GSA	General Services Administration; Geologic Survey of Alabama
GSBP	Ground Scar Boiler Plant
GSSI	Geophysical Survey Systems, Inc.
GST	ground stain
GW	groundwater
gw	well-graded gravels; gravel-sand mixtures
HA	hand auger
HCl	hydrochloric acid
HD	distilled mustard
HDPE	high-density polyethylene
HEAST	Health Effects Assessment Summary Tables
Herb.	herbicides
HHRA	human health risk assessment
HI	hazard index
HNO_3	nitric acid
HQ	hazard quotient
HQ_{screen}	screening-level hazard quotient
hr	hour
H&S	health and safety
HSA	hollow-stem auger
HTRW	hazardous, toxic, and radioactive waste
‘I’	out of control, data rejected due to low recovery
ICAL	initial calibration
ICB	initial calibration blank
ICP	inductively-coupled plasma
ICRP	International Commission on Radiological Protection
ICS	interference check sample
ID	inside diameter
IDL	instrument detection limit
IDLH	immediately dangerous to life or health
IDM	investigative-derived media
IDW	investigation-derived waste
IEUBK	Integrated Exposure Uptake Biokinetic
ILCR	incremental lifetime cancer risk
IMPA	isopropylmethyl phosphonic acid
IMR	Iron Mountain Road
in.	inch
Ing	ingestion
Inh	inhalation
IP	ionization potential
IPS	International Pipe Standard
IRDMIS	Installation Restoration Data Management Information System
IRIS	Integrated Risk Information Service
IRP	Installation Restoration Program
ISCP	Installation Spill Contingency Plan
IT	IT Corporation
ITEMS	IT Environmental Management System ™
‘J’	estimated concentration
JeB2	Jefferson gravelly fine sandy loam, 2 to 6 percent slopes, eroded
JeC2	Jefferson gravelly fine sandy loam, 6 to 10 percent slopes, eroded
JfB	Jefferson stony fine sandy loam, 0 to 10 percent slopes have strong slopes
JPA	Joint Powers Authority
K	conductivity
K_{ow}	octonal-water partition coefficient
L	lewisite; liter
LC_{50}	lethal concentration for 50 percent of population tested
LD_{50}	lethal dose for 50 percent of population tested
l	liter
LBP	lead-based paint
LCS	laboratory control sample
LC_{50}	lethal concentration for 50 percent population tested
LD_{50}	lethal dose for 50 percent population tested
LEL	lower explosive limit
LOAEL	lowest-observed-advserse-effects-level
LT	less than the certified reporting limit
LUC	land-use control
LUCAP	land-use control assurance plan
LUCIP	land-use control implementation plan
max	maximum
MCL	maximum contaminant level
MCPA	4-chloro-2-methylphenoxyacetic acid
MDC	maximum detected concentration
MDCC	maximum detected constituent concentration
MDL	method detection limit
mg	milligrams
mg/kg	milligrams per kilogram
mg/kg/day	milligram per kilogram per day
mg/kgbw/day	milligrams per kilogram of body weight per day
mg/L	milligrams per liter
mg/m^3	milligrams per cubic meter
mh	inorganic silts, micaceous or diatomaceous fine, sandy or silt soils
MHz	megahertz
µg/g	micrograms per gram
µg/kg	micrograms per kilogram
µg/L	micrograms per liter
µmhos/cm	micromhos per centimeter
min	minimum
MINICAMS	miniature continuous air monitoring system
ml	inorganic silts and very fine sands
mL	milliliter
mm	millimeter
MM	mounded material
MMBtu/hr	million Btu per hour
MOGAS	motor vehicle gasoline

List of Abbreviations and Acronyms *(Continued)*

MPA	methyl phosphonic acid
MPM	most probable munition
MR	molasses residue
MS	matrix spike
mS/cm	millisiemens per centimeter
MSD	matrix spike duplicate
MTBE	methyl tertiary butyl ether
msl	mean sea level
MtD3	Montevallo shaly, silty clay loam, 10 to 40 percent slopes , severely eroded
mV	millivolts
MW	monitoring well
Na	sodium
NA	not applicable; not available
NAD	North American Datum
NAD83	North American Datum of 1983
NAVD88	North American Vertical Datum of 1988
NAS	National Academy of Sciences
NCP	National Contingency Plan
ND	not detected
NE	no evidence; northeast
ne	not evaluated
NEW	net explosive weight
NFA	No Further Action
ng/L	nanograms per liter
NGVD	National Geodetic Vertical Datum
Ni	nickel
NIC	notice of intended change
NIOSH	National Institute for Occupational Safety and Health
NLM	National Library of Medicine
NPDES	National Pollutant Discharge Elimination System
NPW	net present worth
No.	number
NOAA	National Oceanic and Atmospheric Administration
NOAEL	no-observed-adverse-effects-level
NR	not requested; not recorded; no risk
NRC	National Research Council
NRCC	National Research Council of Canada
ns	nanosecond
N-S	north to south
NS	not surveyed
nT	nanotesla
NTU	nephelometric turbidity unit
nv	not validated
O&G	oil and grease
O&M	operation and maintenance
OB/OD	open burning/open detonation
OD	outside diameter
OE	ordnance and explosives
oh	organic clays of medium to high plasticity
ol	organic silts and organic silty clays of low plasticity
OP	organophosphorus
ORP	oxidation-reduction potential
OSHA	Occupational Safety and Health Administration
OSWER	Office of Solid Waste and Emergency Response
OWS	oil/water separator
oz	ounce
PA	preliminary assessment
PAH	polynuclear aromatic hydrocarbon
Parsons	Parsons Engineering Science, Inc.
Pb	lead
PCB	polychlorinated biphenyl
PCE	perchloroethene
PCP	pentachlorophenol
PDS	Personnel Decontamination Station
PEL	permissible exposure limit
PES	potential explosive site
Pest.	pesticides
PETN	pentarey thritol tetranitrate
PFT	portable flamethrower
PG	professional geologist
PID	photoionization detector
PkA	Philo and Stendal soils local alluvium, 0 to 2 percent slopes
POL	petroleum, oils, and lubricants
POW	prisoner of war
PP	peristaltic pump
ppb	parts per billion
PPE	personal protective equipment
ppm	parts per million
PPMP	Print Plant Motor Pool
ppt	parts per thousand
PR	potential risk
PRG	preliminary remediation goal
PSSC	potential site-specific chemical
pt	peat or other highly organic silts
PVC	polyvinyl chloride
QA	quality assurance
QA/QC	quality assurance/quality control
QAP	installation-wide quality assurance plan
QC	quality control
QST	QST Environmental, Inc.
qty	quantity
Qual	qualifier
‘R’	rejected data; resample
R&A	relevant and appropriate
RAO	removal action objective
RBC	risk-based concentration
RCRA	Resource Conservation and Recovery Act
RD	remedial design
RDX	cyclonite
RfD	reference dose
ReB3	Rarden silty clay loams
REG	regular field sample
REL	recommended exposure limit
RFA	request for analysis
RGO	remedial goal option
RI	remedial investigation
RL	reporting limit
RPD	relative percent difference
RRF	relative response factor
RSD	relative standard deviation
RTECS	Registry of Toxic Effects of Chemical Substances
RTK	real-time kinematic
SAD	South Atlantic Division
SAE	Society of Automotive Engineers
SAIC	Science Applications International Corporation
SAP	installation-wide sampling and analysis plan
sc	clayey sands; sand-clay mixtures
Sch.	Schedule
SCM	site conceptual model
SD	sediment
SDG	sample delivery group
SDZ	safe distance zone; surface danger zone
SEMS	Southern Environmental Management & Specialties, Inc.
SFSP	site-specific field sampling plan
SGF	standard grade fuels
SHP	installation-wide safety and health plan
SI	site investigation
SL	standing liquid
SLERA	screening-level ecological risk assessment
sm	silty sands; sand-silt mixtures
SM	Serratia marcescens
SOP	standard operating procedure
sp	poorly graded sands; gravelly sands
SP	submersible pump
SQRT	screening quick reference tables
Sr-90	strontium-90
SRA	streamlined human health risk assessment
Ss	stony rough land, sandstone series
SS	surface soil
SSC	site-specific chemical
SSHO	site safety and health officer
SSHP	site-specific safety and health plan
SSL	soil screening level
SSSL	site-specific screening level

List of Abbreviations and Acronyms *(Continued)*

SSSSL	site-specific soil screening level
STB	supertropical bleach
STC	source term concentration
STEL	short-term exposure limit
STOLS	Surface Towed Ordnance Locator System®
Std. units	standard units
SU	standard unit
SUXOS	senior UXO supervisor
SVOC	semivolatile organic compound
SW	surface water
SW-846	U.S. EPA's *Test Methods for Evaluating Solid Waste: Physical/Chemical Methods*
SWPP	storm water pollution prevention plan
SZ	support zone
TAL	target analyte list
TAT	turn around time
TB	trip blank
TBC	to be considered
TCA	trichloroethane
TCDD	2,3,7,8-tetrachlorodibenzo-p-dioxin
TCDF	tetrachlorodibenzofurans
TCE	trichloroethene
TCL	target compound list
TCLP	toxicity characteristic leaching procedure
TDGCL	thiodiglycol
TDGCLA	thiodiglycol chloroacetic acid
TERC	Total Environmental Restoration Contract
TIC	tentatively identified compound
TLV	threshold limit value
TN	Tennessee
TNT	trinitrotoluene
TOC	top of casing; total organic carbon
TPH	total petroleum hydrocarbons
TRADOC	U.S. Army Training and Doctrine Command
TRPH	total recoverable petroleum hydrocarbons
TSCA	Toxic Substances Control Act
TSDF	treatment, storage, and disposal facility
TWA	time-weighted average
UCL	upper confidence limit
UCR	upper certified range
'U'	not detected above reporting limit
USACE	U.S. Army Corps of Engineers
USACHPPM	U.S. Army Center for Health Promotion and Preventive Medicine
USAEC	U.S. Army Environmental Center
USAEHA	U.S. Army Environmental Hygiene Agency
USACMLS	U.S. Army Chemical School
USAMPS	U.S. Army Military Police School
USATCES	U.S. Army Technical Center for Explosive Safety
USATEU	U.S. Army Technical Escort Unit
USATHAMA	U.S. Army Toxic and Hazardous Material Agency
USC	United States Code
USCS	Unified Soil Classification System
USDA	U.S. Department of Agriculture
USEPA	U.S. Environmental Protection Agency
USGS	U.S. Geological Survey
UST	underground storage tank
UTL	upper tolerance level
UXO	unexploded ordnance
UXOQCS	UXO Quality Control Supervisor
UXOSO	UXO safety officer
V	vanadium
VOA	volatile organic analyte
VOC	volatile organic compound
VOH	volatile organic hydrocarbon
VQlfr	validation qualifier
VQual	validation qualifier
VX	nerve agent (O-ethyl-S-[diisopropylaminoethyl]-methylphosphonothiolate)
Weston	Roy F. Weston, Inc.
WP	installation-wide work plan
WS	watershed
WSA	Watershed Screening Assessment
WWI	World War I
WWII	World War II
XRF	x-ray fluorescence
yd^3	cubic yards

<u>SAIC – Data Qualifiers, Codes and Footnotes, 1995 Remedial Investigation</u>

N/A – Not analyzed

ND – Not detected

Boolean Codes

LT – Less than the certified reporting limit

Flagging Codes

9 – Non-demonstrated/validated method performed for USAEC

B – Analyte found in the method blank or QC blank

C – Analysis was confirmed

D – Duplicate analysis

I – Interfaces in sample make quantitation and/or identification to be suspicious

J – Value is estimated

K – Reported results are affected by interfaces or high background

N – Tentatively identified compound (match greater than 70%)

Q – Sample interference obscured peak of interest

R – Non-target compound analyzed for but not detected (GC/MS methods)

S – Non-target compound analyzed for and detected (GC/MS methods)

T – Non-target compound analyzed for but not detected (non GC/MS methods)

U – Analysis in unconfirmed

Z – Non-target compound analyzed for and detected (non-GC/MS methods)

Qualifiers

J – The low-spike recovery is low

N – The high-spike recovery is low

R – Data is rejected